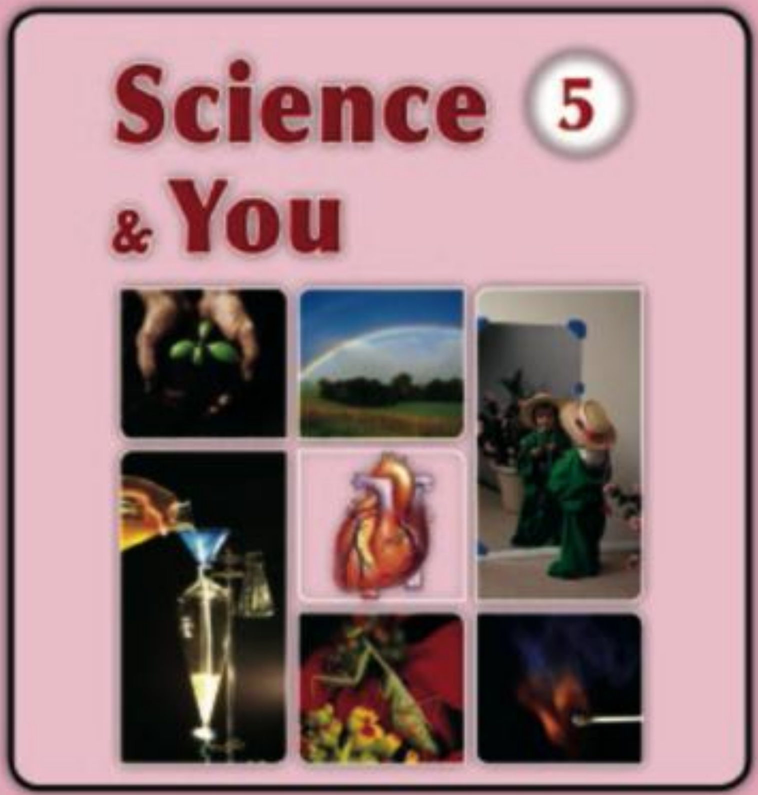


This book is mainly built for teaching and learning science for our sons, through developing their skills of observation, inquiry, comparison and deduction.

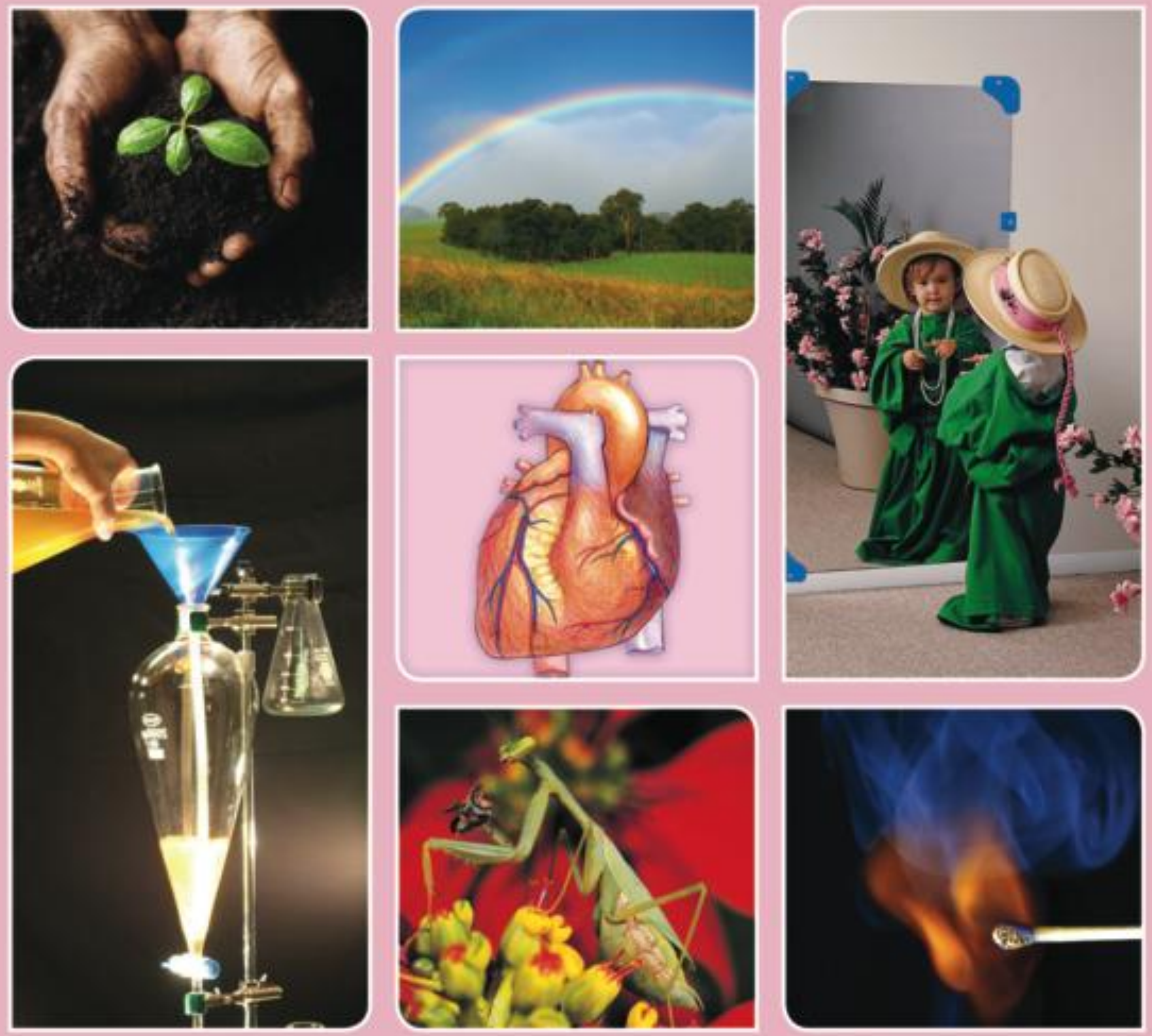
The content of this book is set according to the national standards and indicators of the ministry of education.

We hope that the content of the book would be enjoyable for both students and teachers as well as to achieve the Egyptian educational policy.

الأشــراف برنتنج هاوس

Arab Republic Of Egypt
Ministry of education
BOOKS SECTOR

Science 5 & You



2105-2016

غير مصرح بتداول هذا الكتاب
خارج وزارة التربية والتعليم

Fifth Primary
Second Term

Student's Book

Arab Republic of Egypt
Ministry of Education
Book Sector

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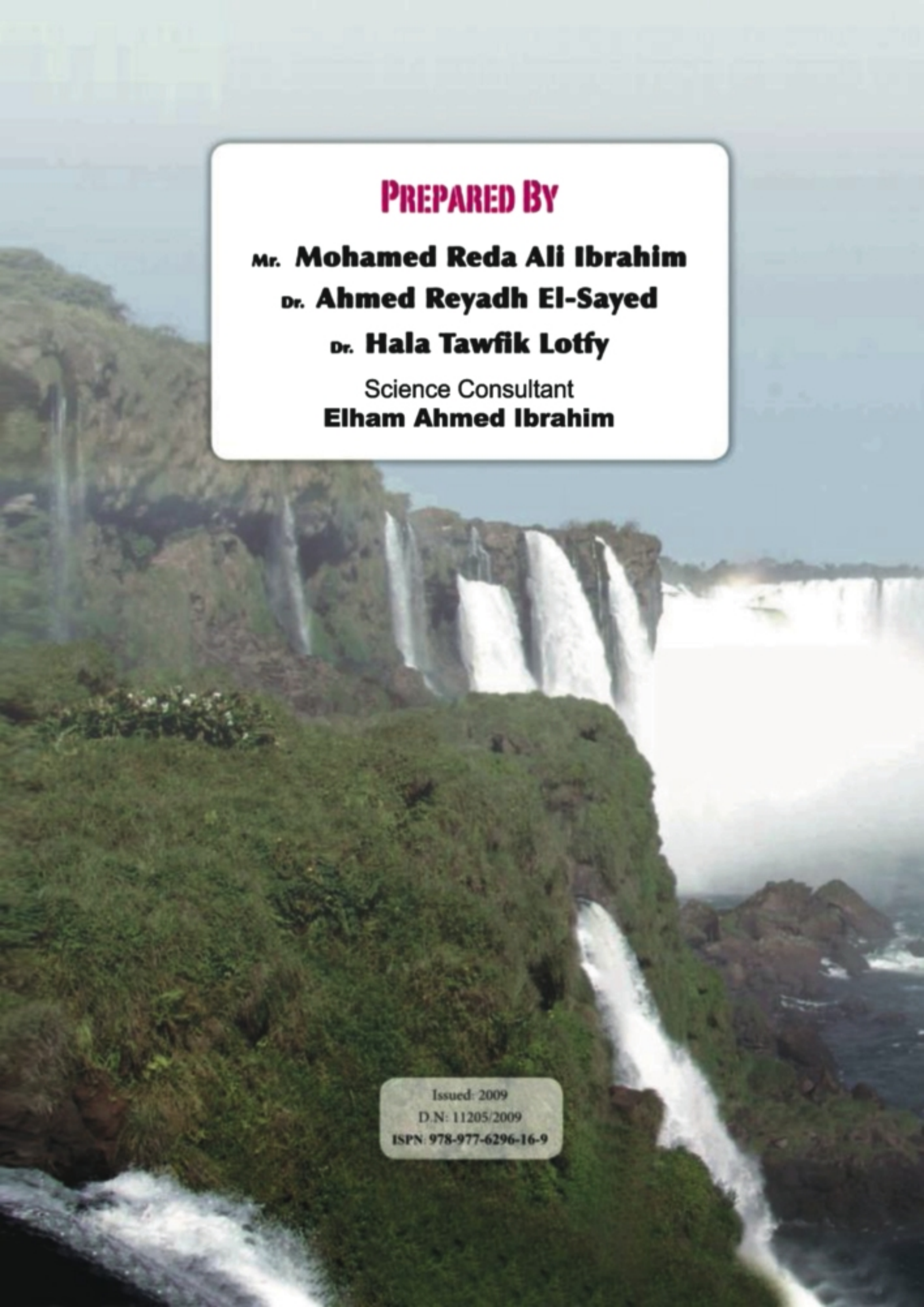

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Issued: 2009

D.N: 11205/2009

ISPN: 978-977-6296-16-9

Preface

This book **Science and You** achieves the objectives of developing curricula in order to cope with the 21^{st} century. According to the following educational directions:

- Activating the relation between Science and Technology in the science domain and its reflection on the development process.
- Emphasizing the suitable situations that distinguish the effect of the scientific and technological progress in producing knowledge.
- Selecting students practicing their active and conscious behavior toward using the technological outcomes.
- Developing students' abilities in the scientific thinking methodology, then the possibility to move from learning depending on receiving knowledge to learning depending on self-learning in an atmosphere of joy and amusement.
- Exploring information and gain much experiences through developing the essential thinking skills such as observation, analysis, concluding and reasoning.
- Providing opportunities to students for practicing citizenship through the methods of self-learning and the team work spirit, negotiating and confessing, accepting others and rejecting extremists.
- Enriching students with various life skills, and the practical capabilities through increasing all interests in the practical and scientific domain.

Science and You contains three integrated units, each one contains a set of integrated lessons achieving the concerned objectives.

We hope that this book may benefit our sons for the favour of our country Egypt.

Preparation Team

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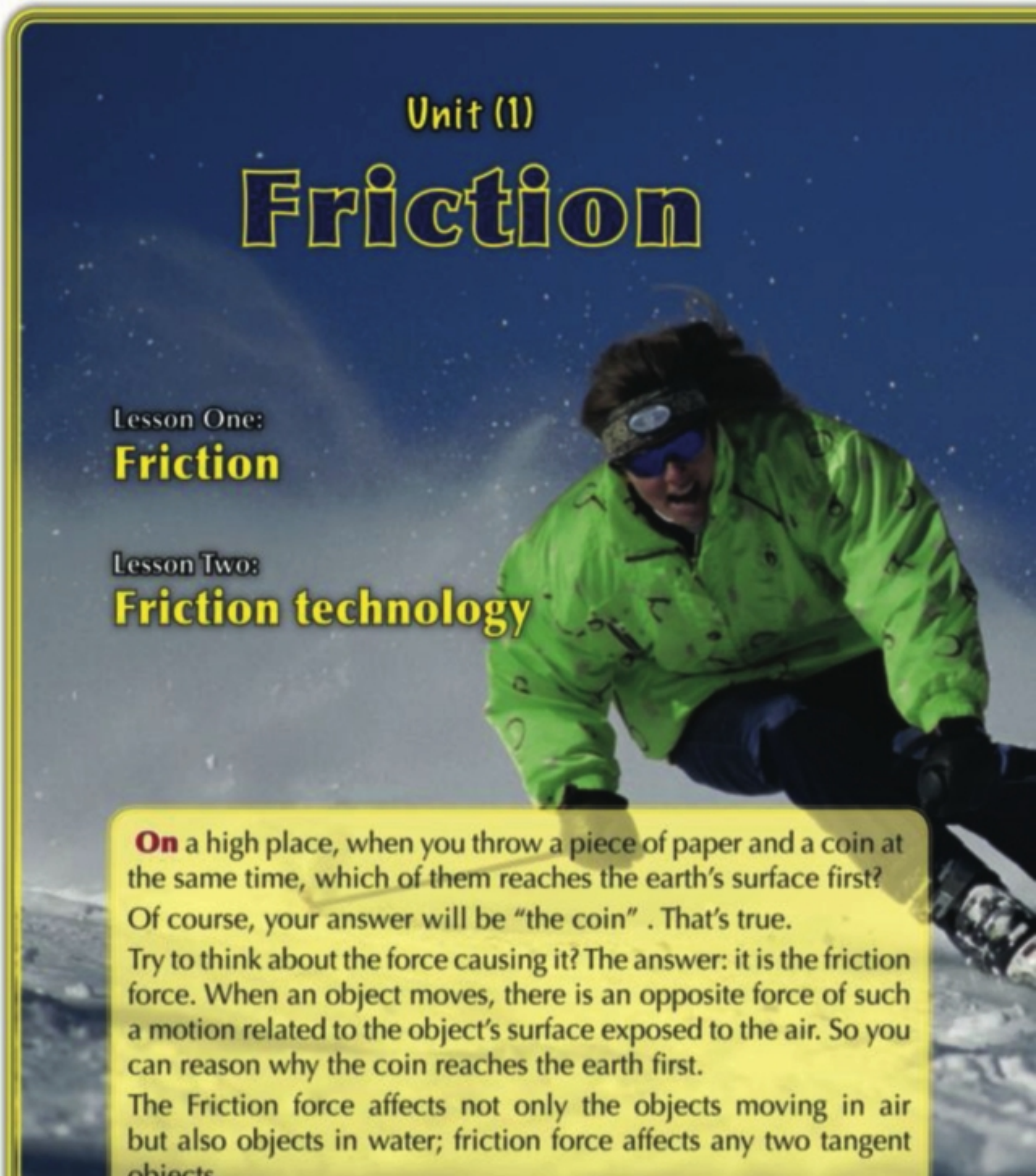


Unit (1)

Friction

Lesson One:

Friction

Lesson Two:

Friction technology

On a high place, when you throw a piece of paper and a coin at the same time, which of them reaches the earth's surface first?

Of course, your answer will be "the coin" . That's true.

Try to think about the force causing it? The answer: it is the friction force. When an object moves, there is an opposite force of such a motion related to the object's surface exposed to the air. So you can reason why the coin reaches the earth first.

The Friction force affects not only the objects moving in air but also objects in water; friction force affects any two tangent objects.

In this unit, you will learn how much friction is important and has applications in our real life. On the other hand, it has harms, too.

Unit Objectives

By the end of this unit, the student should be able to:

- Identify the concept of friction.
- Give some examples that show the friction of objects with water and air.
- Explain the advantages and disadvantages of friction.
- Explain the importance of the streamline shapes of fish, aircrafts and rockets.
- Recognize the friction effect on the movement of objects.

Lesson (1 - 1)

Friction

Objectives

By the end of this lesson, the student should be able to:

- Identify the concept of friction.
- Conclude that friction force depends on the type of material of the two surfaces.
- Recognize the types of friction force.
- Explain the disadvantages of friction.
- List some ways to decrease the friction forces.

Fig. (1)
A small rubber ball.

What is friction?

Activity — The motion on the floor

- **Materials:** a rubber ball
- **Steps:**
- If the floor of your playground is different from the one in your class room, bring a small rubber ball and let it roll on:
  1 The sandy floor of the playground.
  2 The smooth floor of the classroom.
- **Conclude:**

  In which case does the ball move for a longer distance? Why?

- **Therefore**, we can observe that the ball stops moving after a little time in the case on the playground, but it keeps moving for a longer time in case on the class room floor. Why?

Activity — A bike motion

- When you ride a bike and push the pedal, it moves forwards (Fig. 2).

  If you lift your feet from the pedal during the movement of the bike, will the bike keep moving in the same direction?

- Will the bike keep moving at the same speed?
- Does the bike's speed decrease gradually?
- **Discuss with your classmates:**
  - Why does the bike's speed decrease?
  - What does slow down the bike?

Therefore, we can see that there is a force which slows down the bike. This force is called "Friction force".

Fig. (2)
The effect of friction force exists between the tire and the ground.

Of this activity, we Conclude that:
The effect of friction force exists between the bicycle tires and the ground where this force has an effect in the opposite direction of the movement. Therefore, the bicycle slows down.

Activity Friction force

Fig. (3)
The cube is stationary on an inclined surface.

- **Materials:** A smooth wooden board – some books – a cube of plastic (or any other available material).
- **Steps:**
  1. Put the cube on the top of the inclined wooden board in a way not allowing the cube to slide down (figure 3).
     - **Conclude:** Is there any friction force between the cube and the board although there is no movement?

Fig. (4)
The cube is moving on an inclined surface.

2 Start increasing the slope of the wooden board until it reaches a position in which the cube starts to slide down (figure 4).

Is there any friction force between the cube and the wooden board during the cube's movement?

- **Observation :**

1 The friction force is between the surfaces of two objects that one of them is relatively constant to the other. This force prevents the object from moving in a sliding way on the wooden board while going up.

2 When the cube slides down on the wooden board, it is affected by a less friction force. When the cube moves down, the direction of the friction force is upwards.

- **Therefore, we can conclude that:**
  - Friction occurs between two surfaces when one of them touches the other. The friction force is always in the opposite direction of the moving object.

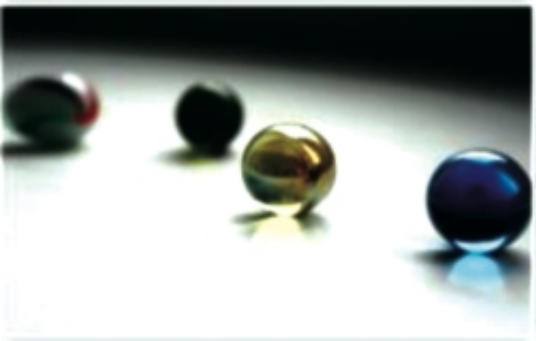


Fig. (5)
If you roll a marble on the earth, does it keep endless rolling?

Activity A ball movement

- If you throw a ball on a wooden (rough) ground and on a ceramic (smooth) surface respectively, will it keep moving endlessly?
- Does the distance covered by the ball change in both cases?
- What is the cause of stopping the ball in both cases?

From this activity, we Conclude that:
The ball stops in both cases by the effect of friction

- **Does the friction force change due to the change of the material type of each surface?**

> **Terms**
> - Friction force: It is the amount of force that exists between two surfaces and affects the movement in the opposite direction.

Friction force:

It expresses the friction force between two surfaces with a certain amount. The larger this amount is, the greater the friction force is.

The following chart shows the change of friction force between two types of surfaces of two objects. Study this chart and answer the following questions:

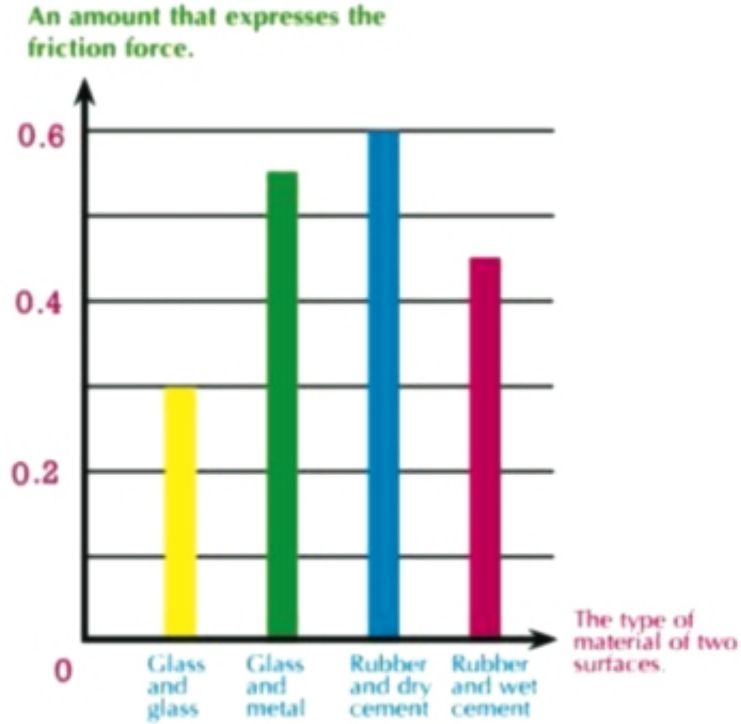


Fig. (6)
The relation between the friction and type of material of the surface

- Which one is greater than the other, the friction force between rubber and dry cement or between glass and metal?
- If you throw a rubber ball on a dry cement floor, and then you throw it again on a wet cement floor with the same strength, in which case will the ball move for a longer distance? Why?

> **Home activity**
> Search in your home for the useful and unuseful friction sources.
> Draw a chart for the different examples.
> Find out a way to decrease the friction such as lubrication.

Friction disadvantages:

Fig. (7)
The damage of machines internal parts is one of the friction disadvantages.

The direction of friction force is always against the force that causes the movement. In most cases, the internal parts of machines are often damaged as a result of the friction force between their moving parts (Fig. 7). This friction causes a rise in temperature of these parts. If the temperature rises up more than a certain limit, it causes the damage of machines and accordingly a lot of money is wasted.

Ways of decreasing the friction force:

1. Using lubricants and oil to decrease the effect of the friction force between the internal surfaces of the machines moving parts such as the car engine. Lubricants and oil form a thin layer between the two surfaces; and this will decrease the effect of the friction force.

2. Technicians use which is called ball bearings (Fig. 8) to be put between the surfaces of the machines internal moving parts.

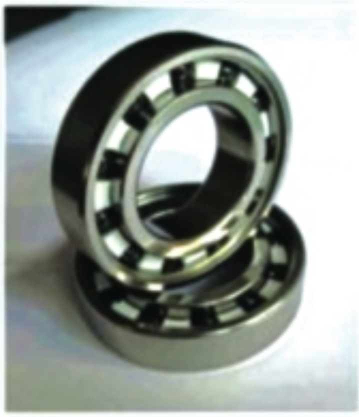


Fig. (8)
Why are ball bearings used in the machines internal parts?

Ball bearing are formed of a group of small metallic balls which have smooth surfaces. Therefore, the friction force between them is almost non-existent.

Ball bearing are used, for example, at the axis that transmits the motion from the car engine into the wheels.

Lesson (1 - 1) Exercises

1 Put (✔) or (✘) in front of each of the following sentences and correct the wrong sentences:

a. The friction force is always in the same direction of the object's movement.

b. The friction force between two surfaces is greater, on moving than stopping.

2 **Write the scientific terms that expresses the following sentence:**

A force that slows down the moving object and has its effect in the opposite direction of the object's movement.

3 **Answer the following questions:**

a. Mention the disadvantages of the friction force.

b. Mention the most important ways that can be used to decrease the disadvantages of friction force.

4 **Complete the following sentences:**

a. .... is used to decrease the effect of friction force between the internal moving parts of machines.

b. Friction force has its effect on the .... direction of the object's movement.

c. The force that slows down the objects motion is called ....

Lesson (1 - 2)

Friction Applications

Objectives

By the end of this lesson, the student should be able to:

- Identify the friction effect on the motion of the objects in air and water.
- List the factors that affect the friction force.
- Explain the importance of the streamline shapes of moving objects.
- Identify some life applications that depend on friction.

The effect of friction force on objects motion in the air:

When an object moves so fast in the air (such as rockets or trains), the friction force between this object and air increases, since the area of the surface exposed to the air is large.

So, we notice the rockets, aircrafts and trains are designed in streamlined shapes (Fig. **9**) to decrease the friction force resulting from the motion through air.

Fig. (9)
The streamlined shape of rockets, planes and trains

Air and water resistance:

Friction is not restricted to solids sliding or tending to slide over one another. Friction also occurs in liquids and air.

The friction occuring on something moving through air, is called «air resistance»(Fig. **10**).

Fig. (10)
What is the effect of air resistance on the bird motion?

The friction acting on something moving through water is called «water resistance» (Fig. **11**).

Fig. (11)
Friction force between the boat and water.

Air resistance of objects motion:

Air resistance of objects motion can only be observed on things that move so fast. To deduce that, do the following activity:

Terms
- Air resistance: It is a type of friction force resulting from object's movement in air.
- Water resistance: It is a type of friction force resulting from object's movement in water.

Activity: Air resistance

- When you run, do you observe the effect of the air resistance on your movement?
- When you ride a bike so fast, do you observe the effect of the air resistance in this case?

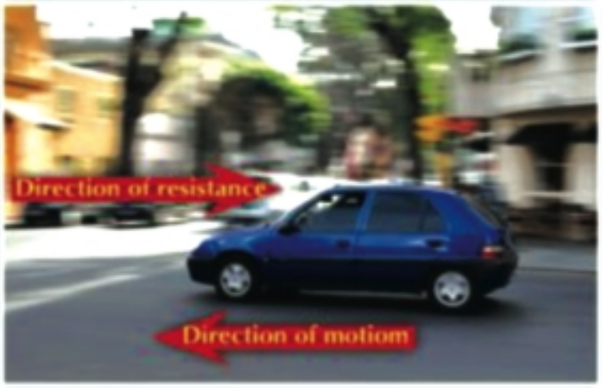


Fig. (12)
The direction of air resistance is in opposite direction of the car movement.

You can apply this activity on a moving car. In this case, air resistance affects the car in the opposite direction of its movement (Fig. **12**). The air resistance is just like the friction force because it impedes the car movement. The effect of air resistance is great and clear when the car moves so fast and it decreases when the car moves slowly.

Fig. (13)
This happens to the parachutist as well. When he opens the parachute to increase the air resistance (the friction force) and accordingly he decreases his falling speed so as to land safely.

When the amounts of both the force of air resistance and the force that moves the car are the same, this means that the elective forces on the car are equivalent, so that the car moves at a constant velocity.

A direct relation is found between the object surface exposed to air and the amount of air resistance. The more area of the surface exposed to the air increases, the more the amount of the air resistance increases (it means that the amount of friction force increases between the moving object and the air).

The effect of friction force on object motion in water

When an object moves so fast in the water (such as ships or fish), the friction force between this object and water increases, since the area of surface exposed to water increases. As we studied before, the friction force has its effect on the opposite direction to the object's movement.

Fig. (14)
Water friction force on the fish

For example, the movement of a fish in water is opposite to the force resulting from friction with water (Fig. 14).

- **Explain:** The importance of the streamlined shape of the fish.

Fig. (15)
The effect of friction force on fish in water.

Advantages of friction:

- A car moves forward because there is friction between the tires and the ground (Fig. **16**). Accordingly, the car movement needs friction with the increase of the speed or even the change of the car's direction.
- Do you know that you can walk due to the friction between your shoes and the ground? Without this friction, you will slip down, and accordingly you can not move (Fig. **17**).
- Lighting of a match needs friction too (Fig. **18**).

Fig. (16)
Friction enables you to control the car speed.

Fig. (17)
You can not walk without friction as it prevents your shoes from slipping on the ground.

Fig. (18)
Friction is essential to light a match.

Enrichment

Reducing the consumption of cars fuel:

When a car moves so fast, air friction increases with the car's body. Therefore, it causes the increase of the air resistance that has an effect in the opposite direction of the car movement. To overcome this resistance, more energy is exerted with the continual use of the fuel. Therefore, the consumption of fuel will increase.

Therefore, car drivers should not increase the car speed up to a certain limit to decrease the friction force between the air and the car. It is noticed that the streamlined shape in the design of modern cars increases so as to reduce the air friction.

Fig. (19)
The streamlinity of cars designs reduces air resistance

Enrichment

Rubber tires

Water on roads decreases the friction force between the road and the car tires. Therefore, the driver loses control of the vehicle.

When a car moves slowly on a wet road, the car presses the water beneath and the water is squeezed out from under the tires.

If the car moves so fast, there is no enough time for the car tires to squeeze the water out .
So water is trapped between the tires and the road and accordingly, friction is reduced to a great extent making it too hard to control the car.

To prevent water from staying between tires and roads, tires are made in a way in which there are grooves or narrow channels in the middle of the rubber tire along its perimeter. These channels are considered a place for the water to be kept inside.

Fig. (20)
Cars tires with grooves to prevent water from staying between tires and roads.

A set of grooves is linked to that channel. Each groove is made in a curved way in which water can squeeze out.

Lesson (1 - 2) Exercises

1 Put (✔) or (✘) in front of each of the following sentences and correct the wrong sentences :

a. The moving car is affected by air resistance in the same direction of its movement.

b. The air resistance decreases when the car moves so fast.

c. When the friction force between the air and a car is equal to the force that moves it, the car moves at a constant velocity.

d. The relationship between the area of the object surface exposed to the air and the air resistance of its movement is an inverse relation.

e. When the parachutist opens his parachute, the friction force decreases.

2 Give reasons for the following sentences:

a. The fish has a streamline shape.

b. Car drivers should not increase the car speed up to a certain limit.

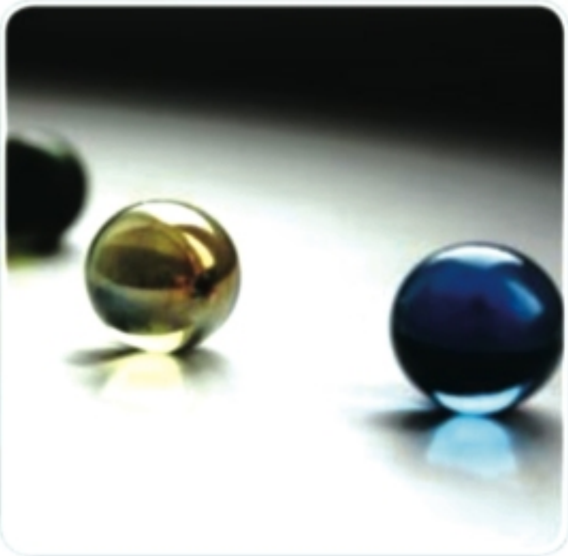
c. Car tires should be replaced when their grooves disappear.

d. Ball bearings decrease the friction between machines internal moving parts.

3 What happens if we drop two similar sheets of paper, one of them is folded and the other is unfolded? Which one reaches the ground first? Give reason.

Evaluate your understanding

- Through such exercise, you can evaluate how much you understand the main concepts in this unit.
- Examine the figures, then answer the following questions.



- When you throw a marble on the ground, why does it slow down gradually? ....
....
....
- What kind of force helps in slowing down the speed of the marble? ....
....
....
- What is meant by air resistance? ....
....
....
- Why does the front part a train have a streamline shape? ....
....
- Give another example.

Evaluate your understanding

- Why does the body of a bird have a streamline shape?

  ....

- Give another example.
- What is the force originated from the motion of a plane in air called? ....

  ....

- Why does a bird stretch its wings on landing? ....

  ....

  ....

- Why does the temperature of an electrical saw get high? ....

  ....

- Why is oil used to lubricate the moving parts of machines? ....

  ....

- Why are ball bearings put between the moving parts in a machine? ....

  ....

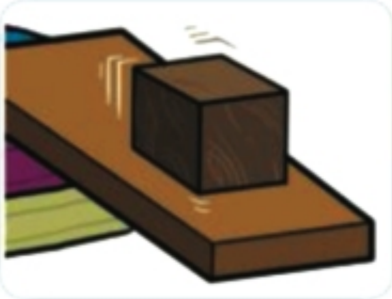
Portfolio

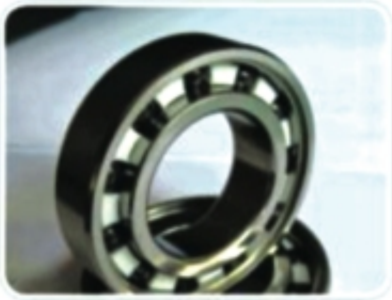
- During your studying of this unit, you have a set of tasks and activities that enrich your portfolio.

- **1st: Design a school magazine:**
  - Share your classmates under the supervision of your teacher to design a school magazine discussing the topics of the unit.
  - Use the figures and photos included in the unit to support the topics of the magazine. The suggest topic are: friction force and advantages and dis advantages of friction. Phenomena in our daily life.
- **2nd: Interesting topics:**
  - Use the school library and internet sites to search for some topics related to the unit, as air and water resistance of moving objects and reducing consumption of car fuels. Magnetic field, electromagnet and its uses, and the compass.
- **3rd: Make models:**
  - Use the available materials in your environment to make models about Friction.
- **4th: School broadcasting:**
  - Prepare an essay about one of the previous topics or another and present it the school broadcast.

Portfolio

- **5th: Field visit:**
  - Share your classmates under the supervision of your teacher in visiting a nearby workshop of cars to see the ways used to overcome the friction.
- **6th: Rewrite a topic from this unit:**
  - Choose a topic from this unit
  - Read it again and divide it into paragraphs.
  - Research about this topic in books of school library or through the internet.
  - Rewrite the topic on your own view.
  - Display the topic to your teacher and your classmates.
  - Add what you rewrite to your portfolio.
- **7th: The team activities:**
  - Work with your classmates to do the following:
  - Write a paragraph about the phenomenon of the friction and its importance in real life applications, then add your performance to the school publication.
  - Make an album involving some photos to the applications of friction in the life different fields.
  - **8th: Designing of a poster:**
  - Choose a topic from this unit and work with your classmates under the supervision of your teacher to design a poster about this topic.





Unit 1 Test

1 Complete the following sentences:

a. The value of .... between two surfaces depends on the type of material of both surfaces.

b. Friction force has its effect in the opposite direction of ....

c. The friction force between the air and the object that moves through is called ....

d. The friction force between water and the object that moves through is called ....

e. .... increases by the increase of the surface area of a moving object.

f. The force of .... acts in the direction of an object's motion.

2 Answer the following questions:

a. The following table clarifies the values of friction force between some surfaces. Study this table and answer the following questions:

The two surfaces	The friction force
Glass and glass	3
Rubber and wet cement	4
Glass and metal	5
Rubber and dry cement	6

1 Why are road partitions made of cement?

2 If you push a marble on a glass surface and another similar one on a metal surface, which one will move for a longer distance? Why?

3 Write the scientific term of each of the following sentences:

a. A set of small balls of smooth surfaces are put together between the internal surfaces of the moving objects of machines.

b. A friction force between air and the moving object through.

4 Give reasons:

a. Lubricants and oil are used in the mechanical machines.

b. Rockets and aircraft have a streamline shape.

c. Car tires have grooves.

d. Ball bearings are used between the surfaces of the moving parts in machines.

e. Car movement needs friction.

5 Put (✓) or (✗) in front of each of the following sentences and correct the wrong sentences :

a. The friction force affects in an opposite direction to the direction of motion.

b. The friction force depends on the shape of the surface of two touching objects.

c. Ball bearings are used to increase the friction force.

d. The pushing of an object forward is opposed by a friction force at the same direction.

e. Oil is used to decrease the friction force.

f. When the affecting forces on a moving object are equivalent, the object continues in its motion with a constant velocity and in a straight line.

g. Air resistance to the objects move in a high speed can not be observed.

Unit (2)

Circulatory system & urinary system

Lesson One:

Circulatory system and circulation

Lesson Two:

Excretion and human urinary system

Think about your day and how you move from place to place in your school building. Exactly, the blood cells move through your entire body the same way you move at the school building. As you know that the blood doesn't move automatically but the heart pumps it through blood vessels. The heart, blood vessels and blood form the circulatory system.

It is a must to know that your lungs help you to get rid of the carbon dioxide produced by your body cells. In addition, your body cells produce other wastes such as excess water and salt which your body is not in need. Your body must get rid of such wastes since their accumulation is over dangerous. Liver and skin are two important organs because they help to get rid of certain wastes whereas your two kidneys are the two main excretory organs in your body.

Unit Objectives

By the end of this unit, the student should be able to:

- Identify the concepts of circulation and excretion.
- List the components of the circulatory system and urinary System, and their main functions.
- Identify the importance of the heart and its role in pumping blood to all the parts of the human body.
- Tracing a red blood corpuscle from the heart to return (blood circulation).
- Identify the role of the urinary system in clearing the body of wastes and harmful substances.
- Identify the role of kidneys in filtering the wastes and harmful substances from the blood.
- Acquire the proper directions to maintain the health of the circulatory and urinary systems.
- Appreciate the greatness of the Creator.

Lesson (2 - 1)

Circulatory system and circulation

Objectives

By the end of this lesson, the student should be able to:

- Define the components of circulatory system.
- Identify the structure and function of the heart.
- Define the blood composition and its functions.
- Summarize the pathway of blood through the blood circulation.
- Know how he can maintain the health of circulatory system.

The human heart and blood vessels:

- Put your hand on your chest, what do you observe?
- Count the beats you may feel in a minute. Record their number.
- If you are wounded, what is the fluid which you observe flow out from your body?
- What is its source?

Fig. (22)
The human heart and blood vessels.

Your circulatory system consists of the heart, blood vessels and blood (Fig. 22). This system transports the digested food, oxygen and water to all your body cells.

It also transports what is formed inside your cells to special organs in your body to get rid of it.

In addition, your circulatory system helps to maintain your body healthy.

First:

The heart

Heart is a muscular pump, about your fist in size. It is located within the chest cavity between the lungs.

Heart consists of four rooms (chambers) which are always full of blood and connected with blood vessels (Fig. 23).

Heart has two sides, namely the right-hand side and left-hand side, and a wall separating them to prevent mixing the blood found in both sides.

The right side consists of a room called the right atrium at the top and the right ventricle at the bottom whereas the left side consists of the left atrium and the left ventricle.

There is a valve, between the atrium and ventricle of each side, allows blood to pass from the atrium to the ventricle and prevents it from returning back.

Do you know?
The heart normally pumps from 4.5 to 5 liters of blood per minute. This rate increases up to three times when exercising.
The heart is about 350 grams in man weighing 70 kg.

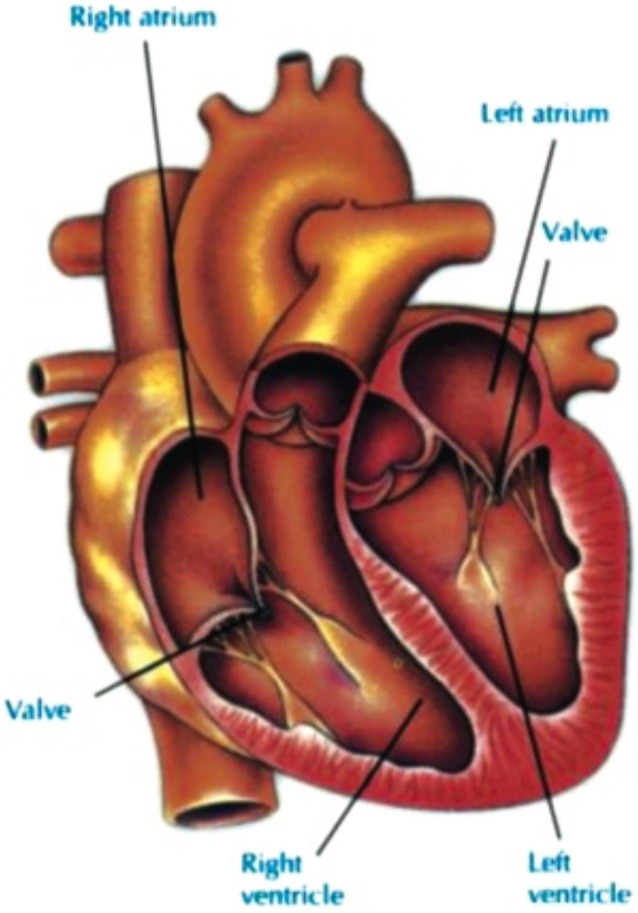


Fig. (23)
The human heart

Second:

Blood vessels

Blood flows inside your body through a network of blood vessels. There are three types of blood vessels (Fig. 24).

a The arteries:

Arteries are blood vessels which emerge from the heart (from the 2 ventricles) and transport blood to all parts of the body. Arteries are large and wide at the beginning, but become smaller and end in a network of blood capillaries near the cells.

All the arteries carry oxygen-rich blood except the pulmonary artery which carries blood containing plenty of carbon dioxide.

b Veins:

Veins are blood vessels that carry blood from different body parts to the heart. They open in the 2 atria. Veins begin in the form of capillaries at the cells, and collect together to become larger and larger until reaching the heart.

c Blood capillaries:

Blood capillaries are a network of thin-walled vessels located within the tissues and around the cells. Their thin wall allows blood to deliver food and oxygen to the cells, and then carries carbon dioxide and waste products.

Functions of blood:

- **Human blood has two general functions, which are:**

(a) The transfer and delivery of materials to the cells of all body parts.

- The red blood cells carry oxygen and carbon dioxide.
- The plasma transports food, vitamins, salts and harmful waste products formed in the cells.
- Blood distributes and keeps the temperature of the body constant.

(b) The defence and protection of the body.

- The white blood cells attack the microbes that cause diseases to human.
- The blood platelets help to heal the wounds.

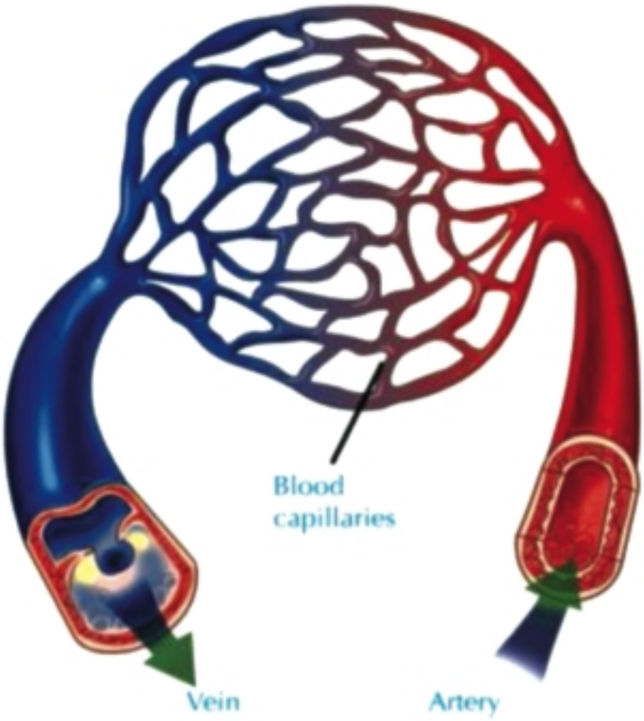


Fig. (24)
The 3 types of blood vessels.

Third:

The Blood:

- **The human blood (Fig. 25) consists of:**

1. **Red blood cells (RBC's):** These are red cells without nuclei. They function to carry oxygen from the lungs to all body cells, and carry carbon dioxide from the cells to the lungs.

2. **White blood cells (WBC's):** These are white cells with nuclei of different forms. They function to defend the body against microbes.

3. **Blood platelets:** They are small-sized cell fragments. They function to coagulate blood (forming blood clot). When the body is wounded and the blood is exposed to the air, this prevents bleeding and infection of the human body.

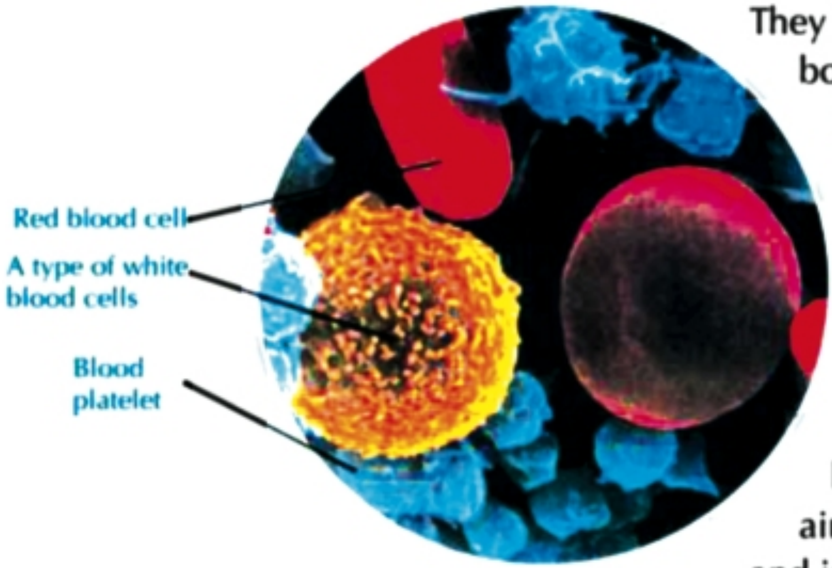


Fig. (25)
Human blood composition.

4. **Plasma:** A yellow watery fluid containing the food that cells need, as well as the harmful waste products formed in the cells. The red blood cells, white blood cells and blood platelets float in blood plasma.

The path of blood through the heart (Fig. 26)

Your heart is a hollow, muscular organ that pumps bloods continuously. The heart from inside is divided into four chambers Each atrium receives blood out of the veins. Each ventricle pumps blood out of the heart through arteries. Try to trace the path of blood in the figure below.

- The 2 large veins which carry the blood from body parts into the right atrium.Then, blood flows into the right ventricle, which contracts pumping blood into pulmonary artery that carries blood to the lungs.

- The pulmonary veins return blood from lungs to the left atrium which pumps blood to the left ventricle. The left ventricle contracts pumping blood into a large artery (aorta) that carries blood to all body parts.

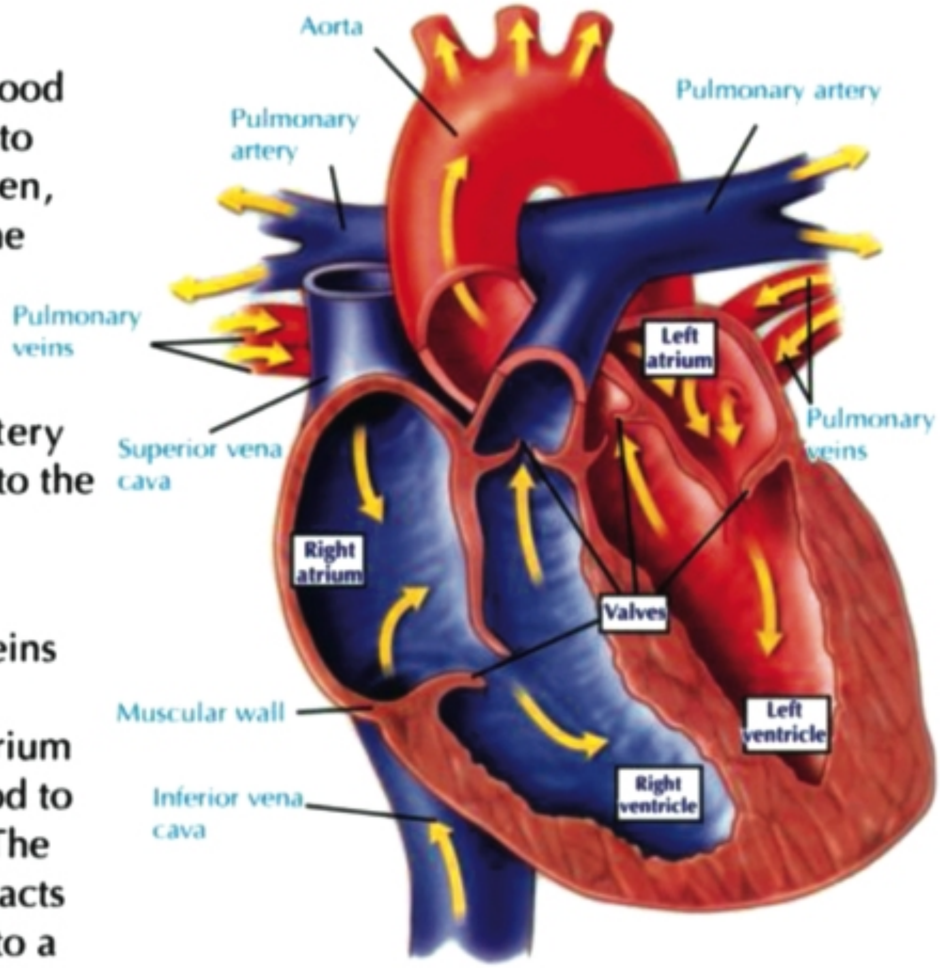


Fig. (26)
The path of the blood through the heart.

Note that the right ventricle pumps blood to lungs,at the same time the left ventricle pumps blood to all body parts.

Fig. (27)
How to measure your pulse?

Activity The source of your heart beats

- Place your arm on a desk, palm up. Place the first two fingers of the other hand against the wrist near the base of your thumb (Fig. 27).
- Do you feel the pulse in your wrist? Do you know its reason? Do you know its source?
- Watching the clock, count your pulse for 10 seconds. Write the number down, then multiply it by 6. This measurement is your heart rate in a minute at rest.

Activity The rate of heart beats

- (Cooperate with one of your classmates in doing this activity).
  1. Sit comfortably and put your hand on your chest. Ask your classmate to observe the time.
  2. Count your heart beats during a minute. How many beats?

  3. Run around several minutes. Count your heart beats for a minute. How many beats?
  4. Do you observe an increasing or decreasing in the rate of your heart beats?
  5. Explain what happens.

Blood circulation (Fig. 28)

The path of blood throughout the body is known as the blood circulation which takes the following steps:

1. The right atrium receives blood carrying carbon dioxide from all body parts by 2 large veins, then blood flows into the right ventricle.
2. Right ventricle contracts pumping the blood into pulmonary artery which carries blood to the two lungs where carbon dioxide is exchanged with oxygen.
3. The blood rich in oxygen returns to the left atrium by veins, then it flows into the left ventricle.
4. Left ventricle contracts pumping the blood rich with oxygen into a large artery (aorta) which carries blood to all body parts.

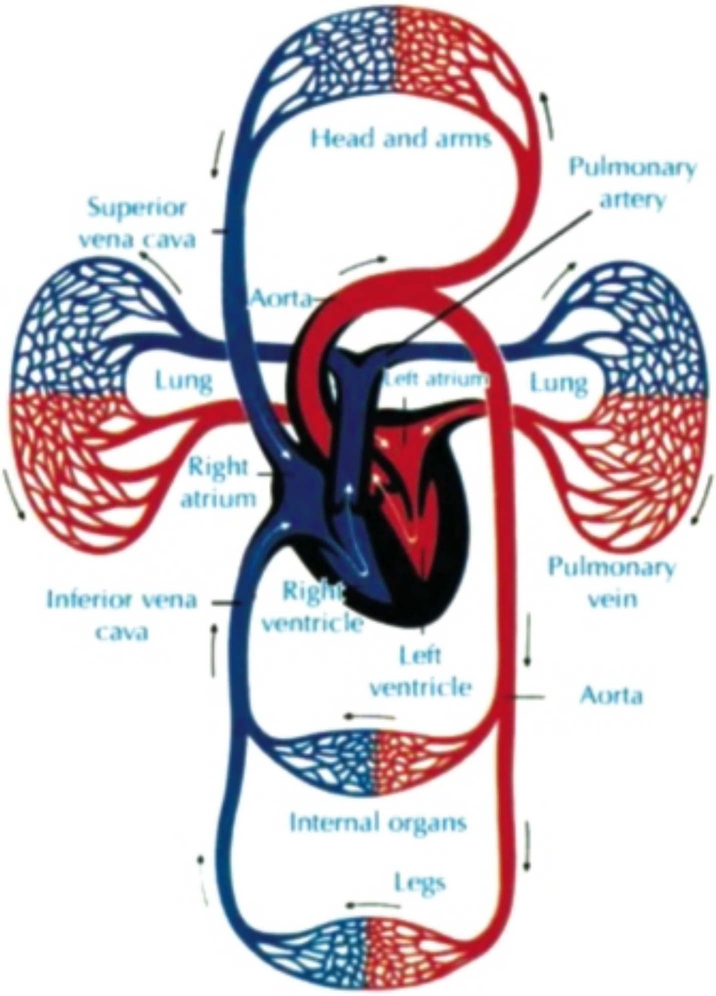


Fig. (28)
Human blood circulation (trace the path of blood by your finger over the figure).

• **Note:**

The blood circulation between the heart and lungs is known as the minor (or pulmonary) blood circulation, while the circulation between the heart and other parts of the body is known as the major (or systemic) blood circulation.

How to maintain the circulatory system healthy?

Fig. (29)
Practising exercise keeps your body healthy.

1. Keep exercising, this strengthes the heart muscle and activates blood circulation (Fig. 29).
2. Eat healthy and balanced food, low in fats and salts (Fig. 30).
3. Eat more fruits and vegetables, that should be fresh and clean.
4. Drink an appropriate amount of clean water every day, especially in the summer.
5. Avoid exposure to infections and accidents. When wounded try your best to stop bleeding. Clean the wound and get appropriate treatment.
6. Avoid smoking and cigarette smokers; smoking harms the heart and weakens blood circulation.

Fig. (30)
Having balanced meals keep your body healthy.

Enrichment

Science, Technology, and Society

The electronic pace maker

Recently, patients of heart diseases which are subjected to heart attack use an electronic pace maker which is implanted beneath the skin and connected to heart muscle by wires.

Both nautral and electronic pace makers work togther by sending signals to heart muscle to work in a regular fashion. And, when the natural pace maker stops after the occurrence of heart attack, the electronic pace maker works alone in order to keep the heart pulsing.

Lesson (2 - 1) Exercises

1 Complete the following sentences:

a. Heart is located within the chest cavity between the ....
b. Heart beats cause .... to all body parts.
c. Heart consists of 4 chambers filled with .... and connected with ....
d. Blood flows inside a network of pipelines called ....
e. The blood vessels that emerge from the heart are called ....
f. .... blood cells attack the microbes that cause diseases to human.
g. .... blood cells carry oxygen and carbon dioxide inside the body.
h. .... keeps body's temperature constant.
i. Blood platelets form .... which help in healing wounds.
j. Left ventricle pushes the blood into the ....
k. .... atrium receives blood from all body parts except the lungs.

2 Give reasons:

a. The two sides of heart are separated.
b. Heart contains valves.
c. Blood flows in one direction only inside the heart.
d. Blood capillaries have a thin wall.
e. It is necessary to keep exercising.
f. Smoking must be avoided.
g. It is necessary to avoid exposure to infection and accidents.

3 Write the scientific term which expresses each of the following sentences:

a. A muscular organ, about the fist in size and located within the chest.

b. The two lower chambers of the heart.

c. The network of pipelines that extend all over the human body.

d. The artery that carries blood rich in carbon dioxide.

e. The blood vessels that collect blood from all body parts and pour it into the heart.

f. The small bodies that play a role in blood coagulation when the body is wounded.

g. A yellow watery fluid in which blood cells float.

h. The flow of blood to the lungs and its returning back again to the heart.

i. Blood circulation between the heart and all body parts except the two lungs.

Lesson (2 - 2)

Excretion and human urinary system

Objectives

By the end of this lesson, the student should be able to:

- Identify the excretory products of human body.
- Describe the structure of human urinary system.
- Identify the role of human urinary system in eliminating body wastes.
- Know the proper mothods of keeping the urinary system healthy.

The waste materials

Body cells burn the digested food by using oxygen to produce energy. This process gives up some waste products such as carbon dioxide and water vapor.

Also, cells produce other wastes which are known as the nitrogen wastes (such as urea and uric acid) when they break down proteins which body uses for growth and repair of damaged tissues. In addition the body gets rid of excess salts.

These wastes which body cells produce are known as the execretory materials. Some of these materials are harmless, but your body cannot use them, while others are more dangerous or poisonous to the body, so the body must get rid of such materials.

- Define the excretory materials.

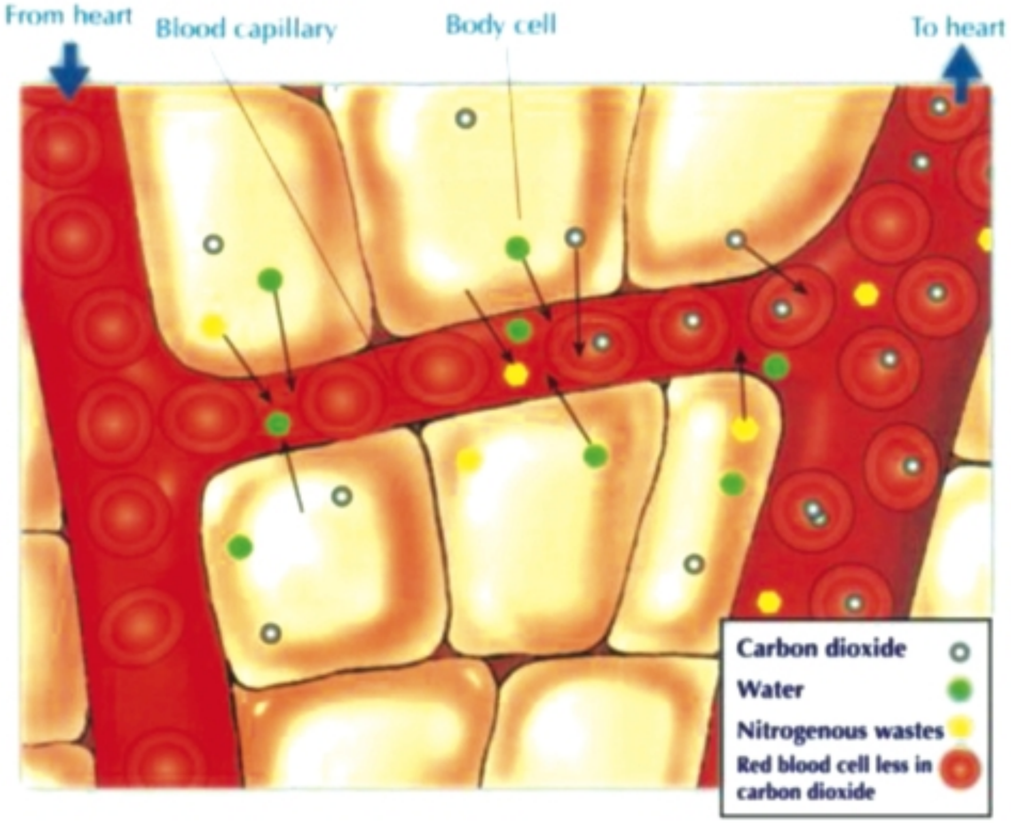
Cell wastes are different from solid wastes which are materials from food that your body cannot digest. Solid wastes are stored in your large intestine before passing out of your body.

- How do your cells get rid of excretory materials?
- The wastes your body cells release move through the thin walls of nearby capillaries (Fig. 31) and enter the blood. The figure below shows this process.

Body cells produce wastes and release them into the capillaries. The blood carries cell wastes to the organs that get rid of the wastes, where:

- Carbon dioxide is exhaled from the lungs.
- Excess salts are expelled out in sweat from the skin.
- Nitrogenous wastes are removed by the kidneys.

Fig. (31)
How the body cells get rid of their excretions.



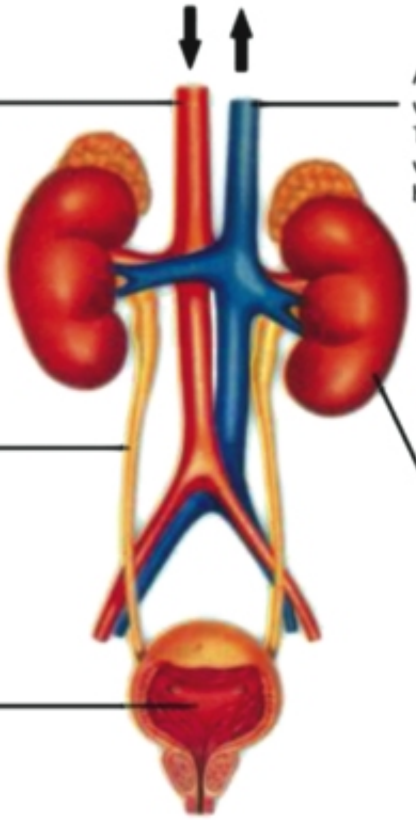
Urinary System and removing wastes from blood:

The urinary system functions to filter the blood of excess salts, urea, uric acid and other waste materials and expels them out in the from of urine.

What are the components of the urinary system, and where does it lie in the body? Human urinary system is located in the cavity of the abdomen near the backbone. It consists of three parts:

An artery carries blood to the kidney. Blood that enters the kidneys contains harmful nitrogenous wastes, in addition to other wastes produced by the body.

A vein transports pure blood which is filtered by the kidney. This blood returns to the heart which pumps it to the other body parts.



The ureter transfers excretory materials from the kidney to the bladder.

Kidneys remove wastes from blood. Each kidney contains about one million minute tubules that filter wastes from blood.

Urine passes slowly from the kidney to **the bladder** where it is stored temporarily until it is released to the outside.

Fig. (32)
The structure of human urinary system

1 The Kidneys:

The kidneys are the most important organs of the urinary system. They are bean-shaped organs located on either sides of the backbone. Blood enters the kidneys through arteries and leaves through veins that carry blood to the heart.

The main function of the kidneys is filtering the blood from urea, uric acid, excess salts and other waste materials, and get rid of them dissolved in water in the form of urine.

2 The ureters:

Ureters are two narrow tubes that carry urine from the kidneys to the urinary bladder.

3 The urinary bladder:

A balloon like sac that receives urine from the ureters. It temporarily stores urine until it is released from the body to the outside through the urethra.

Did you know?

Man needs to drink 2 liters of water a day, and excrete about 1.5 liter of urine per day.

A doctor can diagnose many diseases by examining a report of urine analysis.

Artery, which enters the kidney, carries blood with much waste materials, while the vein, which leaves the kidney carries clean blood to the heart.

Bloody urine indicates infection of urinary tract with disease.

Diseased or injured kidneys (renal failure) may cause poisoning.

Fig. (33)
The body gets rid of excess water and salts through sweating, as shown in the picture of the wrestler.

Getting rid of the excess salts

The body gets rid of excess salts and some other excretory products by secreting sweat (Fig. 33) from special glands in the skin which known as sweat gland.

How to maintain the urinary system healthy?

To maintain the integrity of your urinary system, you must follow the following instructions:

1. Drink appropriate quantities of clean water daily, especially in the summer.
2. Eat healthy and balanced food, low in salts.
3. Avoid schistosomiasis disease (bloody urine) by keeping away and not urinating in irrigation canals.
4. Don't keep urine for long periods. This will affect the function of the kidney.

Lesson (2 - 2) Exercises

1 Complete the following sentences:

a) .... are the main organs of the urinary system.

b) The kidney excretes the wastes dissolved in water in the from of ....

c) .... is connected with the kidney and carries the urine into .. ..

2 Write the scientific term that expresses the following:

a) The group of organs that clarifies the body from the wastes and harmful substances.

b) The system that clarifies blood from excess salts, urea and uric acid.

c) The two organs which excrete carbon dioxide and excess water in the from of a vapour.

d) The fluid which the kidneys produces and contains harmful substances.

e) The narrow tube which connects with the kidney and urine passes through it.

3 Give reasons:

a) Skin is one of the excretory organs.

b) If the 2 kidneys are damaged, the person will die

c) Sweat has a salty taste.

d) Man urinates less in summer than winter.

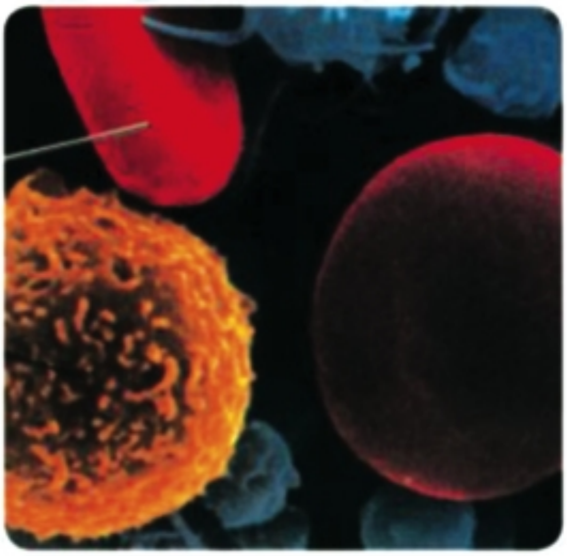
4 State the function of the following:

the kidney - urinary bladder - ureter

Evaluate your understanding

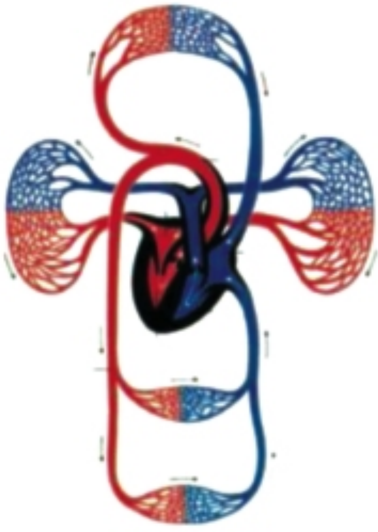
- Through such exercise, you can evaluate how much you understand the main concepts in this unit.
- Examine the figures, then answer the following questions.

- What is this person doing?
  ....
- What is the benefit of what this person is doing to his circulatory system? ....
  ....
- How does this person's behavior help in his excretion process? ....
  ....



- What are the components of blood?
  1. ....
  2. ....
  3. ....
  4. ....
- What is the function of each component?
  1. ....
  2. ....
  3. ....
  4. ....

Evaluate your understanding

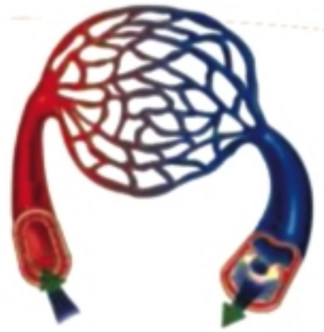


- What is the minor blood circulation? What is its function? ....
....
- What is the major blood circulation? What is its function? ....
....
- What is the relation between the following organs and blood circulation?
  1. Lungs: ....
  2. Kidneys: ....

- Complete:
  - The heart lies in the .... part of the body.
  - Aorta originates from ....
  - Pulmonary artery originates from ....
  - Pulmonary circulation carries .... blood into ....
  - Blood is transported from all parts of the body by .... to the heart.
  - Number of heart beats is .... per a minute.

Portfolio

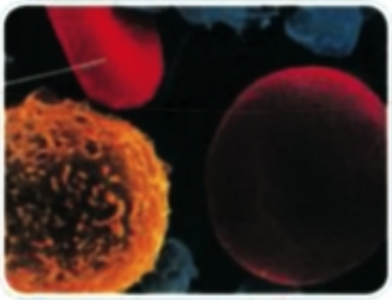
- During your studying of this unit, you have a set of tasks and activities that enriches your portfolio.



- **1st: Design a school publication:**
  - Share your classmates under supervision of your teacher to design a school bulletin that concerns the topics of the unit.
  - Use the figures and photos included in the unit to support the topics of the bulletin. The suggesting topics are: the heart, blood and its transfusion, and the urinary system.
- **2nd: Interesting topics:**
  - Use the school library and internet sites to search about some topics related to the unit, as properties of different components of circulatory system, and heart diseases or kidney failure.
- **3rd: Make models:**
  - Use the available materials in your environment to make models of the heart, circulatory system and urinary system.
- **4th: School broadcasting:**
  - Prepare an essay about one of the previous topics or other and present it thought the school broadcasting.

Portfolio

- **5th: Field visit:**
  - Share your classmates under supervision of your teacher in visiting a hospital or a blood bank.
- **6th: Rewrite a topic from this unit:**
  - Choose a topic from this unit
  - Read it again and divide it into paragraphs.
  - Research about this topic in books of school library or through the internet .
  - Rewrite the topic on your own view.
  - Display the topic to your teacher and your classmates.
  - Add what you rewrote to your portfolio.
- **7th: The team activities:**
  - Work with your classmates in preparing a school report about the circulatory and urinary systems most common diseases and how to avoid such diseases.
  - Write a paragraph about the blood circulation and the circulation process in the human blood, then add it to your school publication.
  - **8th: Designing a poster:**
  - Choose a topic from this unit and work with your classmates under supervision of your teacher to design a poster about this topic.



Unit 2 Test

1 Complete the following sentences by using the following words:

(plasma - valve - veins - left ventricle - clot - pulmonary artery - blood platelets - urea - urinary bladder – urethra – uric acid)

a) Vessels that carry blood to the heart are called ....

b) There is a .... between atrium and ventricle on each side of the heart.

c) The tube, which extends from the bladder and opens outside the body is called ....

d) When the left atrium contracts, it pushes the blood to the ....

e) All the arteries carry blood rich in oxygen except ....

f) .... is a balloon like Sac.

g) Blood consists of red blood cells, white blood cells, ... and ....

h) Urine consists of water containing excess salt, ... and ....

i) When the blood is exposed to the air, a bloody .... is formed.

2 Put (✔) or (✘) in front of each of the following sentences and correct the wrong sentences:

a) There are valves within the heart cavity.

b) The aorta delivers blood to the lungs.

c) White blood cells defend the body against microbes.

d) Eating meals rich in fats and salts activate the circulatory system.

e) Keeping the urine and delaying getting rid of it benefits urinary bladder.

f) The kidney filters excess water and salts from the human's food.

g) Ureter is a tube that extends from the bladder to open outside of the body.

3 Graph a figure illustrating the heart internal structure and write the data down.

4 Choose the correct answer:

a The heart is a muscular pump in a size of your ....

1- fingers   2- foot   3- fist

b Blood vessels which carry blood from the heart are the ....

1- arteies   2- veins   3- blood capillaries

c Blood components which are responible for attacking the microbes causing diseases to man are the ....

1. red blood cells

2-white blood cells

3-blood platelets

d Carbon dioxide and water vapour are released by the ....

1. Kidneys   2. lungs   3. heart

e Urea is expelled by the ....

1- heart   2- kidneys   3- lungs

5 The figure you see illustrates the human blood composition. Answer the following questions.

a Write the names of the numbered parts.

b What is the function of the 2 components No 1 and 2?

c Which component carries water and food materials.

Unit (3)

The Soil

Lesson One:

Soil Components

Lesson Two:

Types and properties of soil

Lesson Three:

Soil pollution and protection

When you dig a deep whole in an agricultural or desert region or even at your school yard, you may find different colored layers of soil.

Further to that, when you take long drives, you may observe that the soil is not the same along the sides of the route. When you stop your car and have a deep look at the grains of soil, you will see them in different-colored sizes.

In this unit, you will learn about the surface layer of soil and the necessity of it for growing plants, trees and some other living organisms. As you know, plants absorb water from the soil to grow, man and animals feed on these plants, besides there are some animals live inside it.

Unit Objectives

By the end of this unit, the student should be able to:

- Identify the soil as a part of Earth's crust.
- Differentiate between the soil components.
- Describe how Egypt's agricultural soil was formed.
- Identify some types of soil (clay, sand and silt soils).
- Perform experiments to compare between soil types in view of their color, particles size, compactness, aeration, water absorption, fertility and drainage of water.
- Name plant kinds that suit each type of soil.
- Identify soil pollutants.
- Identify the methods that control soil pollution.

Lesson (3 - 1)

Soil components

Objectives

By the end of this lesson, the student should be able to:

- Identify the soil as a part of Earth's crust.
- Differentiate between the soil components.
- Describe how Egypt's agricultural soil was formed.

Have you ever planted seedling or dug a trench in the ground - garden if so, you might have observed that soil has different colors. These different colors help scientists to identify the characteristics of metals inside. Furthermore there are different types of soil such as: color and texture. Some soil textures are sometimes smooth, granular and rocky rough. Types of soil vary since it is made up of various types of rocks and metals. Dead animals remains affect the color and texture of soil.

Fig. (34)
Different plants grow well in different types of soil.

What soil is made of?

Soil is made of more than pieces of rocks . It also has water, air and materials that once was alive. When organisms die, they decay.(To decay means to break down or rot).The decayed material also becomes part of the soil. The decayed remains of plants and animals in soil is called humus. Humus is usually dark brown or black. Humus adds nutrients to soil.

- **Now,** can you define the concept of soil?
- **Soil:** is a thin non compacted superficial layer which covers the Earth's crust.

What is the importance of soil as one of environment main components?

Soil is important to plant, animal and human life as well because without soil,land plants couldn't have grown (Fig. 35). Without plants there would be no food for animals and humans that feed on them. In addition, many organisms take the soil as a home for living. Finally, all land organisms depend on the soil. So, soil is a main component of the environment.

Fig. (35)
Soil is the thin non compacted superficial layer which covers the Earth's crust.

Soil formation

Identify the stages of soil formation from the following pictures.

Rocks break down into very small pieces along the time.

Wind breaks down the rocks.

Water breaks down rocks into smaller pieces.

Fig. (36)
Stages of soil formation

The soil

It is the loose superficial layer of Earth's crust. It is composed of minerals that resulted from breaking down of rocks, mixed with the decayed material of dead organisms. It also contains different micro-organisms .

Soil Components

Activity What is the composition of soil?

- Take a graduated cylinder (or a jar) with a wide mouth. Fill it up to the middle with a sample of your school garden soil.

  Fill the cylinder with water and cover it tightly.

- Shake the cylinder strongly, then put it on a table and left it to stand for 15 minutes (Fig. 37).

Terms

- Humus:

The decayed organisms mixed in soil component.

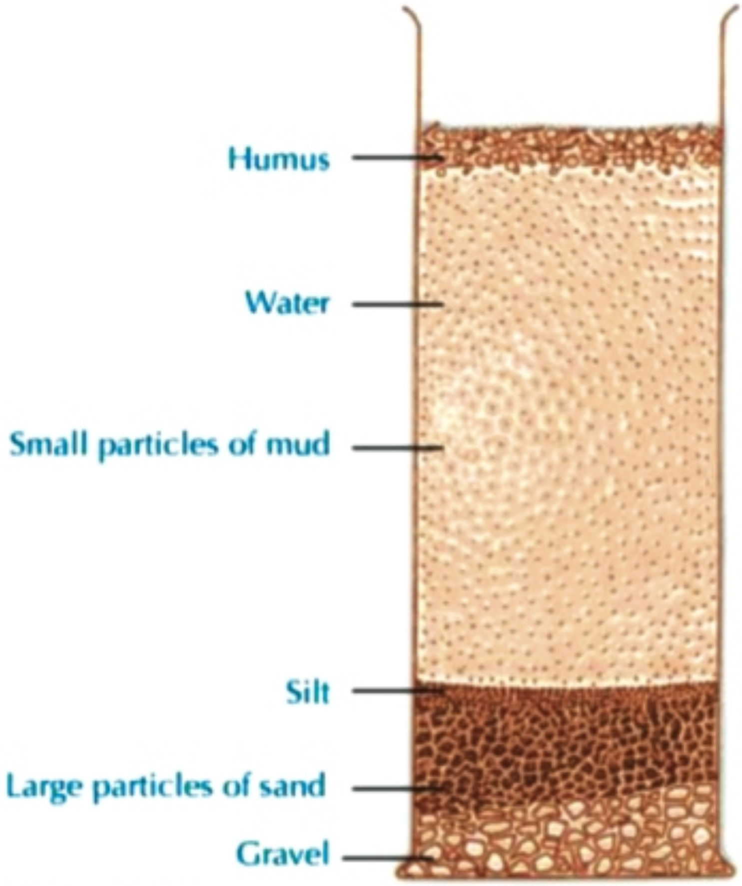


Fig. (37)
What are the soil components?

- **Observations.**

record your observation ....

....

....

How was Egypt's soil formed?

Soil is formed from rocks which have been broken up into particles. The origin of Egypt's soil is the rocks of the Ethiopian plateau exposed for millions of years till now to several factors such as heat, winds, rain and running water. So, rocks were broken into small particles with different sizes and shapes.

The flood water carried these particles to the River Nile and then to the Nile valley (Fig. 38) where they are deposited year after year as layers of clay and silt. These materials are rich in elements that are necessary for plant growth.

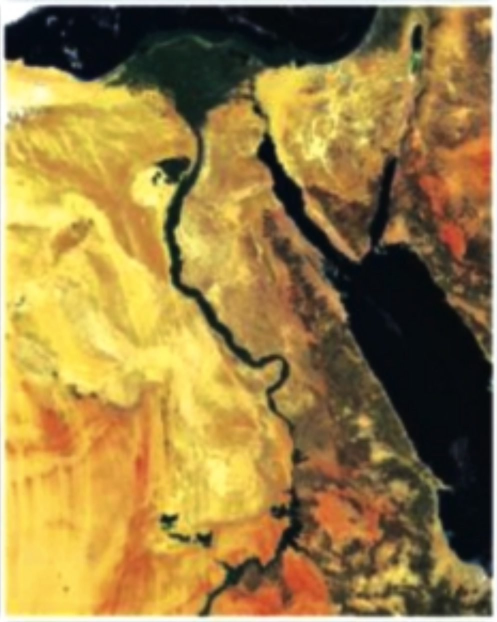


Fig. (38)
The pathway of the flood water carried the particles along the River Nile.

Fig. (39)
Water falls on Ethiopian plateau.

Soil and living organisms ?

All living organisms need the Earth's soil. Plants need the minerals and other nutrients in soil to live and grow. The animals that eat plants depend on soil. Some animals make their homes in soil. Plants and animals take nutrients from the soil. They also add nutrients to it. (Fig. 40) shows some of the activities of life underground. Notice the different layers of the soil.

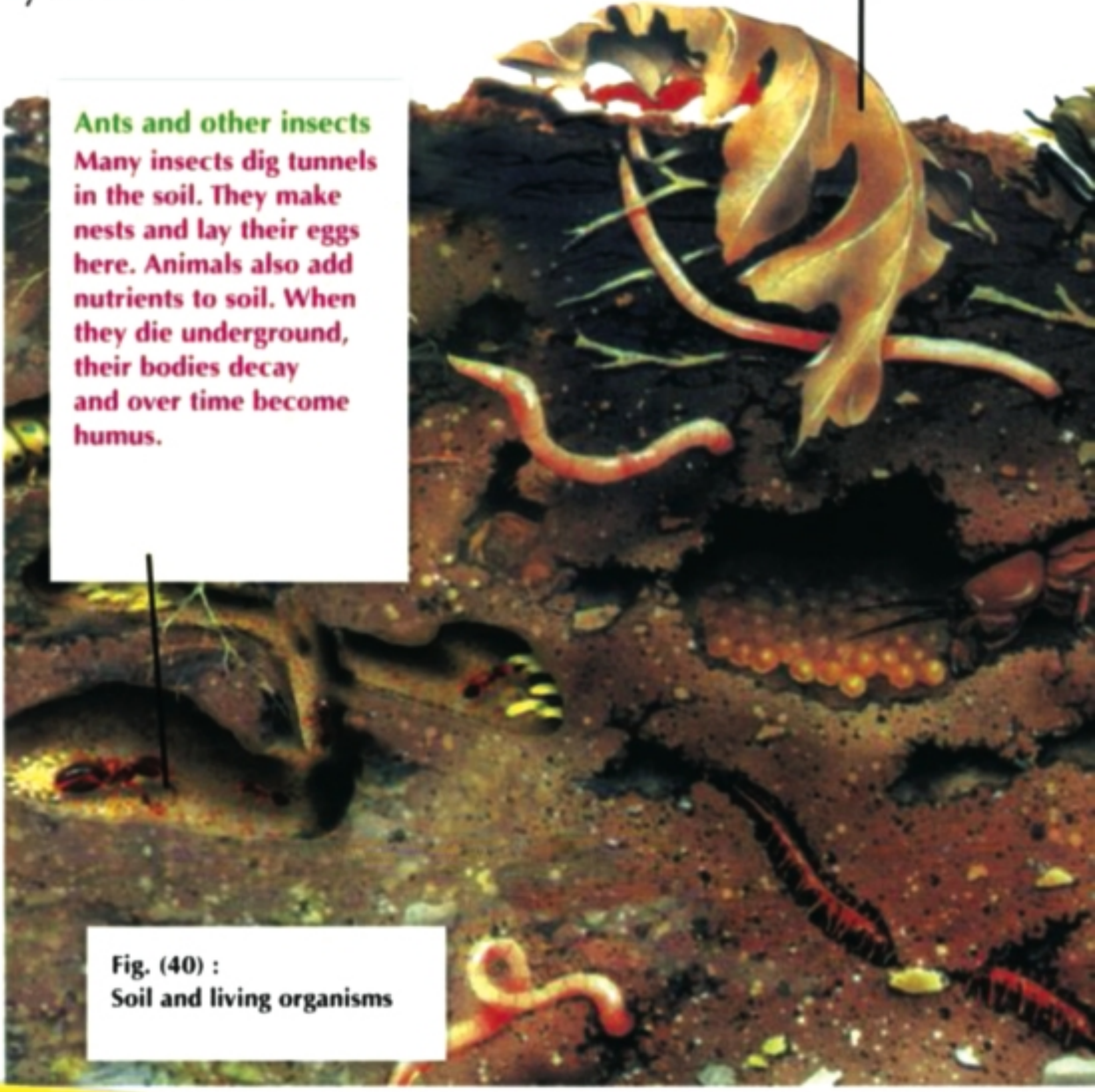
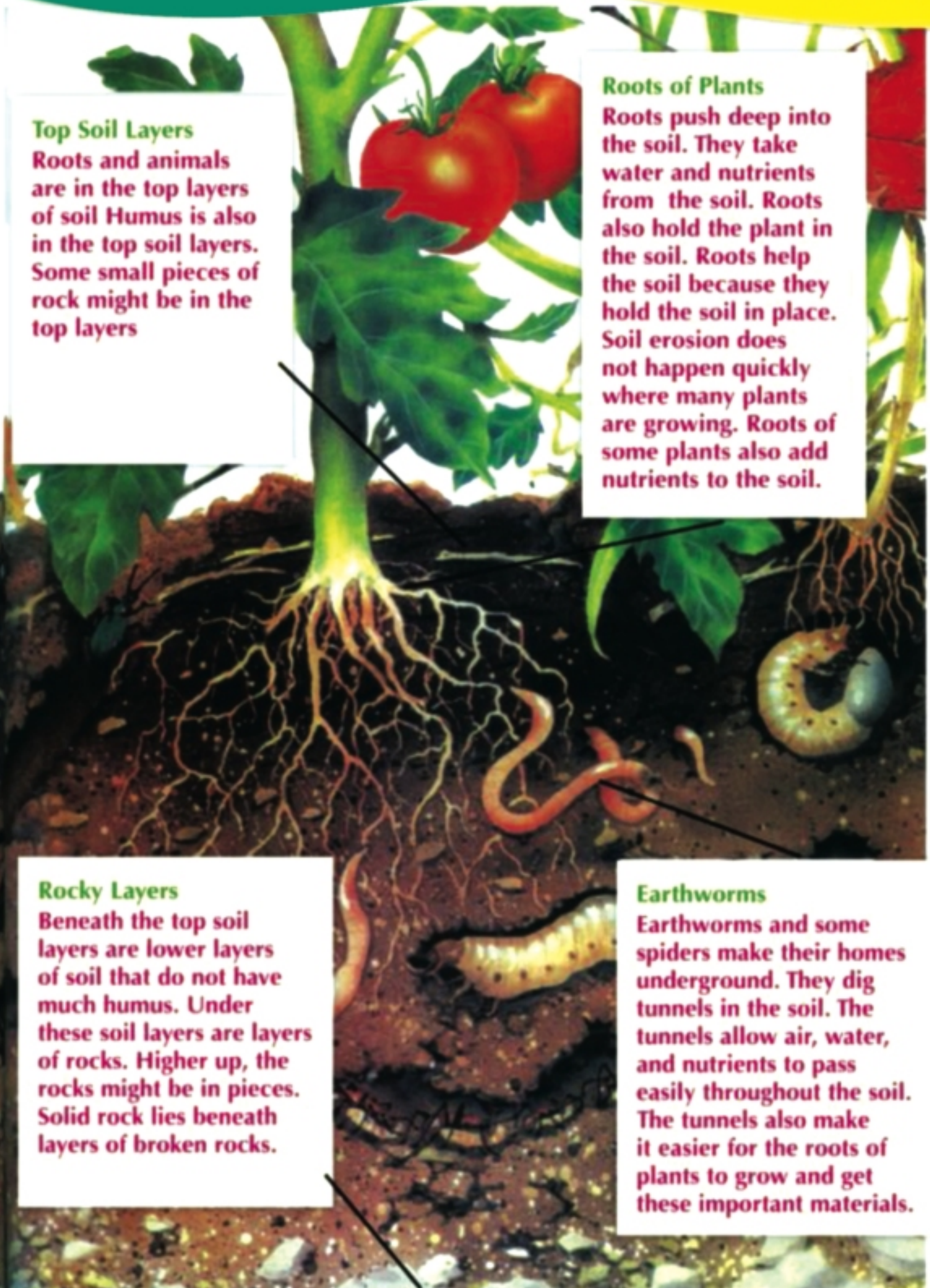


Fig. (40) :
Soil and living organisms



Top Soil Layers

Roots and animals are in the top layers of soil Humus is also in the top soil layers. Some small pieces of rock might be in the top layers

Roots of Plants

Roots push deep into the soil. They take water and nutrients from the soil. Roots also hold the plant in the soil. Roots help the soil because they hold the soil in place. Soil erosion does not happen quickly where many plants are growing. Roots of some plants also add nutrients to the soil.

Rocky Layers

Beneath the top soil layers are lower layers of soil that do not have much humus. Under these soil layers are layers of rocks. Higher up, the rocks might be in pieces. Solid rock lies beneath layers of broken rocks.

Earthworms

Earthworms and some spiders make their homes underground. They dig tunnels in the soil. The tunnels allow air, water, and nutrients to pass easily throughout the soil. The tunnels also make it easier for the roots of plants to grow and get these important materials.

Fig. (40)
Soil and living organisms

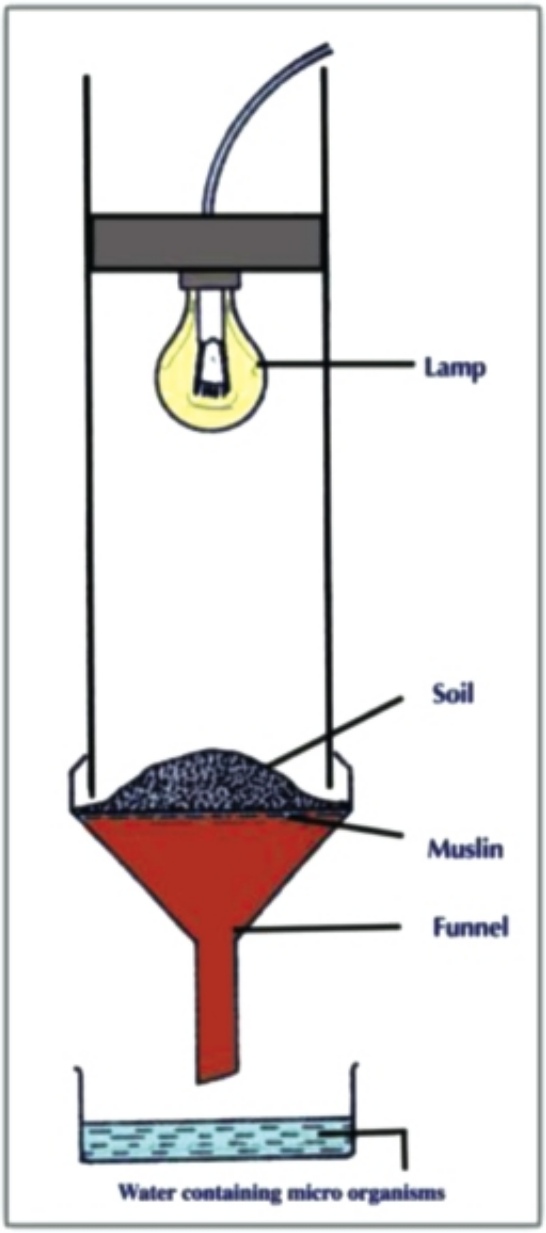


Fig. (41)
Soil micro organisms collection

Try by yourself

Animals found in soil:

Small animals can be extracted through the appartus in the next figure:

1. Put about 250 gm of soil on a filter of muslin cloth then put it on the top of a funnel.
2. Focus light on the funnel, after a while the animals and creatures inside will escape from light as they prefer darkness.
3. Collect the creatures from under the funnel.
4. Write your results on a sheet of paper and add it to your portfolio.

Lesson (3 - 1) Exercises

1 Complete the following statements:

a. The soil contains gravels produced from breaking down of ....

b. The main soil components are ...., ..., ...

c. Water and .... break down rocks into small pieces.

d. Humus add nutrients to ....

2 Write the scientific term for each of the following statements:

a. A thin non-compacted layer which covers the Earth's crust.

b. A soil is mainly composed of clay and silt particles.

c. A soil is rarely contains humus.

3 How was Egypt's agricultural soil formed?

4 Give reasons for each of the following:

a. The soil is the main component of the environment?

b. Roots are important for the soil.

5 What are the soil different components?

6 How do plants and animals affect in soil composition?

7 What is the importance of soil as a main component of the environment?

Lesson (3 - 2)

Types and properties of soil

Objectives

By the end of this lesson, the student should be able to:

- Identify the types of soil.
- Perform experiments to compare between soil types in view of their color, particles size, components, compactness, aeration, water absorption, fertility and drainage of water.
- Name plant kinds that suit each type of soil.

Activity What soil is made of?

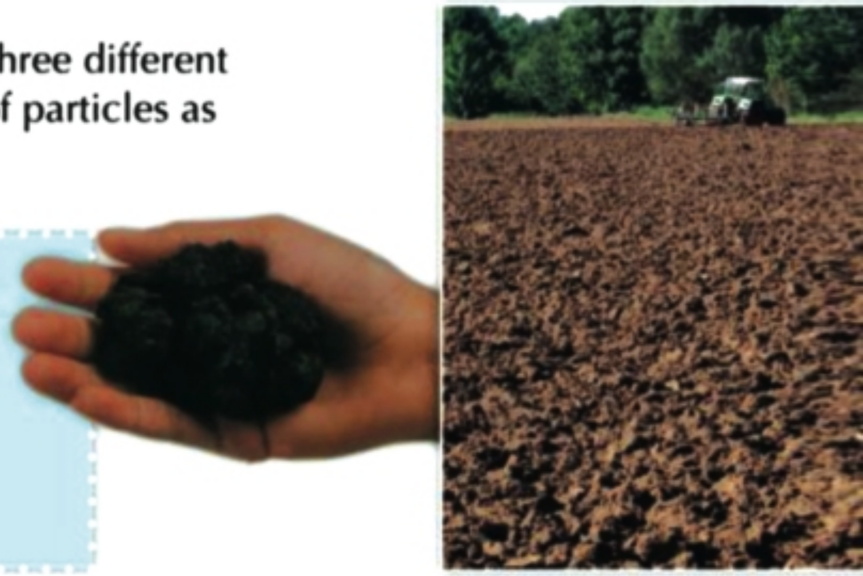
- Cooperate with your classmates to get 3 different colored samples of soils (yellow, dark and gray) from different locations.
- With a hand lens, try to identify different particles each sample is made up of (Fig. 42).
- Compare the shape and color of these particles with that present in the figure.
- Which particles are mainly found in each type of soil.

Fig. (42)
The three types of soil

Types of soil

Soil can be classified into three different types according to the kind of particles as follows:

1 Clay soil
is composed mainly of clay and silt particles and a small amount of sand particles and humus.



2 Sand soil
is composed mainly of sand particles, a small amount of clay and silt particles and rarely contains humus.

3 Silt soil
is composed of a mixture of gravel, sand, clay, silt and more humus.

Fig. (43)
Different types of soil

Comparing the properties of different types of soil

Cooperate with your classmates to conduct the following activities to compare between the distinguishing properties of the different types of soil

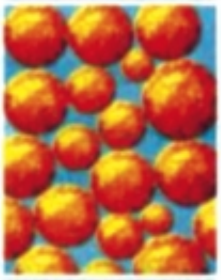
Activity The soil color

Work with your classmates in examining of three samples of sand, clay and silt soils.

- Observe each sample, what is its characteristic color?
  - Sand soil:
  - Clay soil:
  - Silt soil:

Clay soil

Sand soil



Silt soil

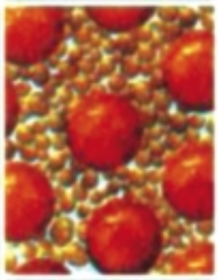


Fig. (44)
Soil particles

Activity Particles size

Take small equal samples of the three different types of soil.

- Spread out each soil sample on a piece of white paper.
- Examine the particles size (Fig. 44) for each of the soil types by a magnifying lens.
- Observe each of the following:
  - Which soil type has the largest size of particles?
  - Which soil type has the smallest size of particles?
  - What is the soil type that contains a mixture of large and small particles?

Activity Compactness of soil particles

Put three equal samples of sand, clay and silt soils (Fig. 45) , separately, in three similar dishes.

Fig. (45)
Three equal samples of sand, clay and silt soils.

Add to each soil sample an equal amount of water to cover it and leave them exposed to the sun and air till they get completely dry.

Try to crush each sample of them by your fingers.

- **Observe:**
  - Which soil type has a great compactness?
  - Which soil type has a little compactness?
  - Which soil type has a medium compactness?

Activity Aeration and water absorption

Get 3 similar glass tubes opened from both ends.

- Tightly cover one end of each tube with a piece of cloth as shown in the figure.
- Put in the three tubes equal amounts of sand, silt and clay soils, separately.
- Immerse the 3 covered ends of the three tubes at equal depths in a basin containing water as in Fig. (46).
- **Observe:** Does the water level rise through the soil inside the three tubes? (yes - no)
- **Explain:** If your answer is «yes»,

  Does the water rising result from the presence of air spaces within the soil? (Yes - No).

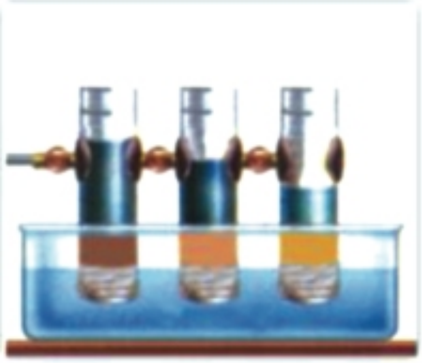
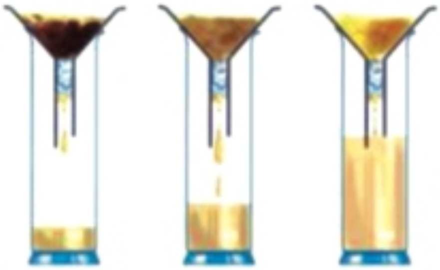


Fig. (46)
An experiment showing aeration and water absorption of different types of soil.

Aeration

Activity Drainage of water through the soil



Clay soil Silt soil Sand soil

Fig. (47)
Soil draining of water differs according to soil particles size and the spaces between these particles (aeration).

- Bring three similar funnels and put a small piece of cotton in each to close their internal holes.
- Put three equal samples of sand, clay and silt soils, separately, in the three funnels. Put a graduated cylinder under each funnel.
- Pour three equal amounts of water in each of the three funnels (Fig. 47).
- **Observe:**
  - Which soil type drains water fastest?
  - Which soil type drains water slowest?
  - Which soil type retains little water?
  - What is the relation between draining water through soil and the aeration of soil?

Activity The fertility

- Soil fertility is related to what it contains of humus.
- Repeat the «What is the composition of soil» activity in the previous lesson using the three types of soil, separately. Compare the amount of humus in each type
- **Observe:**
  - Which soil type contains more humus (more fertile)?
  - Which contains the least?
  - The more fertile soil is ....
  - The least fertile soil is ....

From the activities above, you can conclude the following:

- **Color:** sand soil has a yellow color, clay soil is dark and silt soil is grey.
- **Particles size:** sand soil particles are large, particles of clay soil are small, while that of silt soil are a mixture of large and small particles.
- **Compactness:** sand soil is non - compacted (loose or weak), clay soil is highly compacted (hard), whereas silt soil is medium.
- **Drainage of water:** sand soil has the greatest draining of water, clay soil is the lowest, while silt soil is medium. So, clay soil retains more water than the silt soil which, in turn, retains more water than sand one.
- **Aeration:** sand soil is well aerated; clay soil is poorly aerated, while the silt soil is medium.
- **Fertility:** according to the amount of humus, the soil is fertile. So, sand soil is low fertile (poor in humus), clay soil is fertile and silt soil is highly fertile.

Relation of soil with living organisms
- Helps in fixing plants.
- Provides plants with nutrients and water.
- It is a suitable medium for the activities of some living organisms.

A comparison between different types of soil

Properties	Sand soil	Clay soil	Silt soil
Composition	Sand particles	Clay & silt particles	Mixture of gravel, clay, sand, silt and humus
Color	Yellow	Dark	Grey
Size of particles	Large	Small	Medium
Aeration	Good	Poor	Medium
Compactness	Weak	Hard	Medium
water absorption	Low	High	Medium
Drainage of water	Fast	Slow	Medium
Holding of water	Less	More	Medium
Fertility	Less fertile	Fertile	Highly fertile

The soil and plants?

Plants are affected by the type of soil in which they grow. So, each type of soil suits certain kinds of plants.

- **Sand soil:** is suitable for cultivation of plants that produce tubers such as potato and sweet potato, and the plants which give fruits beneath soil surface such as peanut plants.
- **Clay soil:** suits the cultivation of cotton, rice, sugar cane, wheat and many vegetable plants.
- **Silt soil:** Many plants grow efficiently in this soil such as strawberry, lemon, pomegranate and oranges.

Rice.

Cactus.

Strawberry.

Cotton.

Potato.

Lemon.

Fig. (48)
Each type of soil suits the cultivation of certain kinds of plants

Lesson (3 - 2) Exercises

1 Complete the following statements:

a. The main types of soil are ...., ... and ....
b. The colour of .... soil is dark, while that of .... soil is yellow.
c. .... soil is highly fertile because it contains large amount of ....
d. Clay soil holds .... water and .... soil holds less water.
e. The compactness of .... soil is very weak, while that of .... soil is highly compact.

2 Choose the correct answer:

a. The particles size of clay soil is ....
(large - small - medium)
b. The aeration of sand soil is ....
(good - bad - medium)
c. The most suitable soil for cultivation is .... soil.
(sand - clay - silt)
d. The sand soil .... water more than the other two types of soil.
(drains - holds - retains)

3 Put (✔) or (✘) in front of each of the following sentences and correct the wrong sentences :

a. Wheat plant grows in sand soil.
b. The spaces between the particles of clay soil are large.
c. Cactus plants are seen in sand soil.
d. Silt soil contains gravel, clay, sand, silt and humus.
e. Sand soil is more compacted than silt one.

4 Describe an experiment that you have performed to compare water absorption and draining in different types of soil.

5 Mention three examples of plants that grow in the following types of soil: clay - silt - sand.

Lesson (3 - 3)

How can soil be protected of pollution?

Objectives

By the end of this lesson, the student should be able to:

- Define soil pollutants.
- Know the effects of soil pollution.
- Identify the methods that control soil pollution.

What is the soil pollution?

Pollution can be defined as any change in the environment that disturbs its natural balance and harms its living organisms. The materials that cause this pollution are known as pollutants.

Soil pollutants and their harms

In several attempts, the human wrong behaviour causes soil pollution that decreases its ability for agriculture.

Do you know how and why the cause of this pollution of agricultural soil? What are the pollutants caused by human activity and reduced the ability of agricultural soil for cultivation?

Fig. (49)
Chemical pesticides cause pollution to agricultural crops.

Some agricultural soil pollutants:

ⓐ Chemical pesticides:

Man used chemical pesticides to eradicate pests of agricultural crop plants. Some of these pesticides had leaked into the soil, resulting in the contamination of plants which grow in it (Fig. 49) and this harms the human's health and the animals feed on these plants.

Fig. (50)
Chemical fertilizers have caused pollution of the agricultural crops.

ⓑ Chemical fertilizers:

Agricultural soils are polluted by using of chemical fertilizers (Fig. 50) in great

quantities to compensate the poor of soil with elements required for plant growth and formation of its food. This pollution results in:

1. The death of organisms that live in soil and increase its fertility.
2. Leaking of these materials to plants that grow in the soil and harms humans and animals that feed on these plants.

c Industrial wastes:

Agricultural soil is polluted with all industrial wastes that pollute air and water (Fig. 51), where these pollutants come with irrigation water, wind or dissolved in rain water(acidic rain).This increases soil acidification, dissolves its salts leading to their decreasing and deprives the plants from them.

Fig. (51)
The dumping of industrial wastes in the water caused a decrease in soil salts.

d Increasing soil salinity:

Spacing periods of irrigation leads to dry soil and increases salinity. The high level of groundwater also leads to an increase in the proportion of the salts, causing the loss of cultivated plants (Fig. 52).

Fig. (52)
Increasing soil salinity leads its fallow land.

Activity: Soil salinity pollution affect plant growth

1. Get two equal amounts of the same soil type and put each of them separately in a plate.
2. Add a big amount of table salt to one of them and mix them carefully.

3. Plant some bean seeds in each of them and irrigate the soil carefully.
4. What do you observe after one week? What is your conclusion?

- **Observation:**
- **Conclusion:**

Fig. (53)
Improving drainage of agricultural land.

Ways to protect soil from pollution:

There are many ways and means to achieve this:

1. Rationalizing the use of various kinds of pesticides and depending on the natural enemies of insects (which feed on the agricultural pests) instead of pesticides.
2. Rationalizing the use of agricultural fertilizers, and use natural fertilizers instead of chemical fertilizers
3. Improving the drainage of agricultural land (Fig. 53).
4. Technology investment in waste water treatment prior to disposal in lakes and rivers.
5. Establishment of factories, however, in places far from the farmlands.
6. Follow the technological methods in the treatment of factory wastes (Fig. 54).
7. Irrigation of agricultural lands regularly to prevent their drying and increasing salts in.
8. Promoting environmental awareness among the people, especially in agricultural areas.
9. Recycling of agricultural wastes to useful materials.

Fig. (54)
Technological methods in the treatment of factory wastes.

Lesson (3 - 3) Exercises

1 Put (✓) or (✗):

- a) Adding natural fertilizers leads to soil pollution.
- b) Using insecticides to control agricultural pests protects the soil from pollution.
- c) Soil pollution causes the disappearance of plant and animal groups.
- d) Spacing periods of irrigation leads to increase the validity of the soil.
- e) The pollution is any change in the environment that disturbs its natural balance.

2 How can soil be protected from pollution?

3 Put a circle around the letter that does not match with the following statement:

- From the sources of pollution of agricultural soil is:
  - a) Chemical pesticides
  - b) Salts
  - c) Natural fertilizers
  - d) Asphalt

4 What are the harms resulted from the polluted soil?

Evaluate your understanding

- From this activity, you can evaluate your understanding of the unit concepts.
- Observe these pictures and answer

- What do you see in the picture? ....
....
- Which of the soil types is the best for cultivating plants?
....
- Which of the three is the most in absorbing water? ....
....
- Which of the three types is the most fertile? ....
....

- What do you see in the picture? ....
....
- What caused this phenomenon observed in the picture ....
....
- If your answer is (yes), explain
....
....

Evaluate your understanding

- What do you see in the picture? ....
- Is the organism shown in the picture useful or harmful? ....
- If it is useful, what are the benefits? ....
- If it is harmful, what are the harms? ....

- What do you see in the picture? ....
- Why is this process done in fields? ....
- What are the advantages and disadvantages of this process? ....
- Do the benefits from this process exceeds the harms? ....

Portfolio

- While you study this unit, you have a set of activities and tasks which may enrich your portfolio. You can perform them, then save in the portfolio.

- **1st: Design a school publication:**
  - Share your classmates under supervision of your teacher in making a school bulletin about the topic of soil and the ways of its protection.
  - Illustrate the importance of soil in different fields of every day life.
  - Write some paragraphs encourage your classmate to share positively in soil protection.
  - Clarify the role played by science, technology and society in soil protection.
- **2nd: Search about:**
  - Solution of soil pollution problem.
- **3rd: Make models:**
  - Use the available materials in your environment to make models of different types of soil, composition of soil or comparing different properties of soil types.
- **4th: School broadcasting:**
  - Write an essay related to this unit. Present it to your classmates in the morning through 10 minutes only.

Portfolio

- **5th: Field visit:**
  - Share your classmates under supervision of your teacher in visiting a location for studying the topics of this unit practically.
- **6th: Rewrite a topic from this unit:**
  - Choose a topic from this unit
  - Read it again and divide it into paragraphs.
  - Research about this topic in books of school library or through the internet .
  - Rewrite the topic on your own view.
  - Display the topic to your teacher and your classmates.
  - Add what you rewrote to your portfolio.
- **7th: The team activities:**
  - Work with your classmates in writing a report about the pollution of the environment in the region nearby your school.
  - Write a paragraph about the effect of polluting the agricultural soil on man`s health, then add it to your school publication wall.
- **8th: Designing of a poster:**
  - Choose a topic from this unit and work with your classmates under supervision of your teacher to design a poster about this topic.

Unit 3 Test

1 Complete the following statement:

a. The most important soil pollutants are ……………, …………… and ……………

b. The soil types are ……………, …………… and ……………

c. Silt soil aeration is ……………, clay soil compactness is …………… and the silt soil fertility is ……………

d. The …………… region in Egypt is considered as the best region for rice cultivation.

e. The origin of the agricultural soil in Egypt is the rocks from the …………… plateau.

2 Put (✔) or (✘) in front of each of the following sentences and correct the wrong sentences :

a. The sand soil is strongly compact, has poor ventilation and fertile.

b. The clay soil has poor ventilation.

c. Humus is the remains of fragmented small rocks and was deposited on the Earth's surface.

d. Cactus plant grows in clay soil.

3 Choose the correct answer:

a. The silt soil compactness is ……………
   1- strong 2- weak 3- medium

b. The origin of the agricultural soil in Egypt is from …………… plateau.
   1- Tibet 2- Golan 3- Ethiopian

c. The particles of the clay soil is ……………
   1- tiny 2- medium 3- large

(d) The water drains easily in the .... soil.
1- silt 2- sand 3- clay

(e) Rice grows efficiently in .... soil.
1- clay 2- silt 3- sand

4 Write the scientific term for each of the following:

(a) A thin loose layer covering the Earth's crust.

(b) The remains of the decayed organisms.

(c) A highly fertile soil because it contains suitable dissolved salts and humus.

5 Give reasons for each of the following:

(a) The sand soil has good aeration.

(b) The water level in the clay soil is higher than the water level in both the sand and silt soils.

(c) The silt soil fertility is the highest.

(d) The clay soil has poor aeration.

(e) Soils differ in compactness depending on their types.

(f) The micro organisms that live inside the soil have a great importance.

6 How can we protect the soil from pollution?

7 What are the harms that resulted from soil pollution?

8 Describe an experiment that you have performed describing water draining in different types of soil.

9 Mention three plants that grow in the following soil types:

Sand – Clay – Silt

Second Term Test

1 Write the scientific term of each of the following :

a) The cells which carry oxygen.

b) The artery that carries oxygenated blood to all parts of the body.

c) A set of small balls of smooth surfaces are put together between the internal surfaces of the moving objects of machine.

d) A friction force between air and the moving object through .

e) The soil type rich with humus

f) The most aerated soil

2 Write a brief account about each of the following:

a) Friction.

b) Plasma.

c) Sand soil.

d) Aorta.

e) Sweat.

f) Water resistance.

3 Choose the correct answer:

a) Carbon dioxide and water vapour are released by the ....

1. kidneys 2. lungs 3. heart

b) Urea is expelled by the ....

1. heart 2. kidneys 3. lungs

c) The heart is a mscular pump in a size of your ....

1. fingers 2. foot 3. fist

d) Blood vessels which carry blood from the heart are the ....

1. arteies 2. veins 3. blood capillaries

(e) Blood components which are responsible for attacking the microbes causing diseases to man are the ....

1. red blood cells
2. white blood cells
3. blood platelets

(f) The silt soil compactness is ....

1. strong 2. weak 3. medium

(g) The origin of the agricultural soil in Egypt is from .... plateau.

1. Tibet 2. Golan 3. Ethiopian

(h) The particles of the clay soil is ....

1. tiny 2. medium 3. large

(i) The water drains easily in the .... soil.

1. silt 2. sand 3. clay

(j) Rice grows efficiently in .... soil.

1. clay 2. silt 3. sand

Second Term Test

1. **Put (✔) or (✘) in front of each of the following sentences and correct the wrong sentences:**
   - a. Eating diets rich in fats and salts activate the circulatory system.
   - b. The kidney filters excess water and salts from the human's food.
   - c. Keeping the urine and delaying getting rid of it benefit urinary bladder.
   - d. Ureter is a tube extends from the bladder to open outside of the body.
   - e. There are valves within the heart cavity.
   - f. White blood cells defend the body against microbes.
   - g. The clay soil has poor aeration.
   - h. The sand soil is strongly compact, has poor aeration and poorly fertile.
   - i. The aorta delivers blood to the lungs.
   - j. Humus is the remains of fragmented small rocks and was deposited on the Earth's surface.
   - k. Cactus plant grows in clay soil.

5 Complete the following sentences:

a. The friction force between the water and the object that moves through is called ....

b. The friction force between the air and the object that moves through is called ....

c. Friction force has its effect in the opposite direction of ....

d. The value of .... between two surfaces depends on the type of material of both surfaces.

e. .... increases by the increase of the surface area of a moving object.

f. The most important soil pollutants are ...., ... and ....

g. The force of .... acts in the direction of an object's motion.

h. The soil types are ...., ... and ....

i. The .... region in Egypt is considered as the best region for rice cultivation.

j. Silt soil aeration is ...., clay soil compactness is .... and the silt soil fertility is ....

k. The origin of the agricultural soil in Egypt is the rocks of the .... plateau.

Second Term Test

Exercises on second term

5^{th} grade

Question (1):

Complete the following statements:

1- Pulmonary artery carries .... blood, while pulmonary vein carrries .... blood.

2- .... is the blood vessl that transfers blood from heart to lungs.

3- .... is connected to the kidney and transfers .... to the bladder.

4- The body gets rid of excess salts and water through .... , while it gets rid of carbon dioxide through ....

5- The agricultural soil in Egypt is formed from .... plateau.

6- The .... soil contains more humus.

7- .... soil is the more compactable, while .... is the fast in drainage of water.

8- .... soil is the more suitable for cultivation of most plants.

9- .... ,.............................. and .... are from the pollutants of the agricultural soil.

10- The wet roads leads to .... between the car tires and the road.

11- The circulatory system consists of .... , ... and ....

12- From the components of soil are .... , ... and ....

13- Rice grows efficiently in .... soil.

Question (2):

What's meant by ....?

1- Pulmonary blood circulation.
2- Sweat glands.
3- Humus.
4- Soil pollution.
5- Friction.
6- Ball bearings.
7- Major (systemic) blood circulation.
8-The ureter.
9- The urinary bladder.
10- The pulmonary artery.
11- The fertility of soil.
12- Soil.
13- Silt soil.
14- White blood cells.
15- Blood plasma.
16- Blood vessels.

Question (3):

(1) What's the function of the follwing?

1- Red blood cells.
2- Blood platelets.
3- Plasma.
4- Kidney.

Question (4):

Illustrate the factors which act to break down rocks into small particles with different sizes.

Question (5):

Mention ways of protection soil from pollution.

Question (6):

Mention the advantages of friction force.

Question (7):

How the friction force can be decreased?

Question (8):

Illustrate the importance of soil.

Question (9):

How to maintain the circulatory and excretory systems healthy?

Question (10):

Give reasons for each of the following:

1- The presence of a valve between each atrium and ventricle.

2- We should not eat a lot quantity of fats.

3- The walls of the blood capillaries are thin.

4- Feaces cannot be considered as an excretory material.

5- The car's movement needs friction force.

6- Avoid the overuse for chemical fertilizers.

7- The bat stretches its wings on landing.

8- Train has a streamline shape.

9- The use of lubricants and oil in the internal parts of machines.

10- Putting ball bearings between the internal moving parts of machines.

11- Presence of grooves in the car's tire.

12- The aeration of the sand soil.

Question (11):

Choose the correct answer in each of the following:

1- The grow of .... is preferred in sand soil.

(peanut plant - cotton - vegetables - wheat)

2- .... receives the oxygenated blood from lungs.

(left atrium - right atrium - right ventricle - left ventricle)

3- The brakes of the car is an application on ....

(energy - friction - motion - speed)

4- Adding natural fertilizers to the agricultural soil leads to ....

(increasing fertility - decreasing fertility - death of living organisms - soil pollution)

5- The friction force is in a direction .... to the direction of motion.

(opposite to - perpendicular to - parallel to - same)

6- .... coagulate blood when the body is wounded.

(red blood cells - white blood cells - plasma - blood platelets)

7- .... is the watery part of the blood.

(plasma - blood platelets - red blood cells - white blood cells)

8- The industrial wastes which are produced from soil pollutants leads to

....

(increase the acidity of soil - decrease the acidity of soil - death of living organisms - increase the fertility of soil).

Question (12):

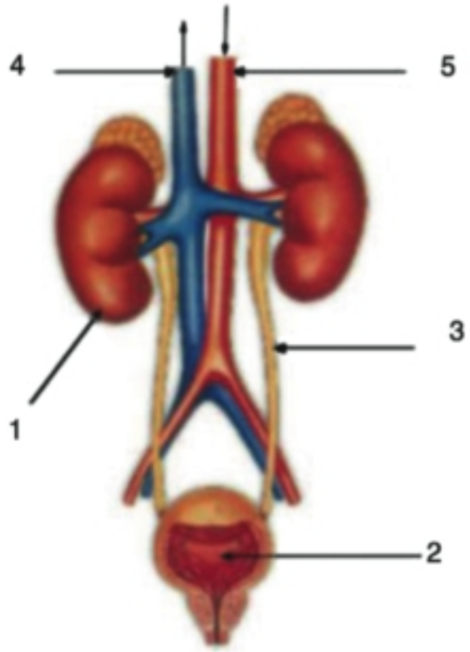
(1) Look at the opposite diagram than answer ....?

1- Name the shown diagram.

2- Label the diagram from 1 to 5.

3- Mention the function of part number (2).

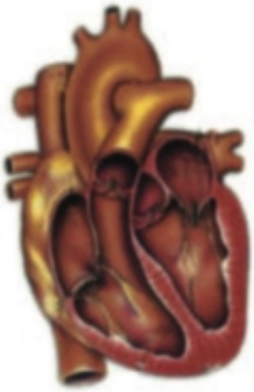
4- Illustrate how urine is formed.



(2) Look at the opposite diagram than answer ....?

1- Illustrate with arrows the path of blood in the heart.

2- Mention the kind of blood in each atrium

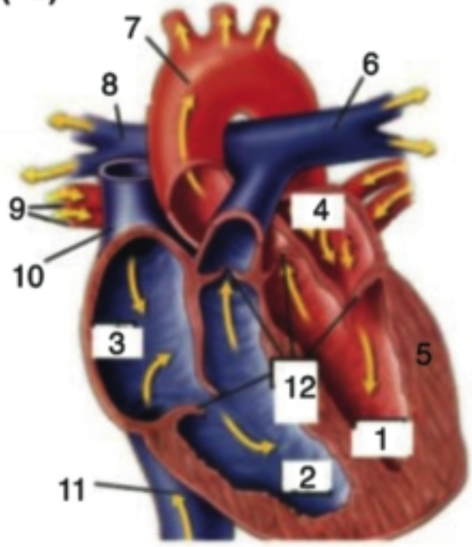


(3) Look at the opposite diagram than answer ....?

1- Label the diagram from 1 to 12.

2- Mention the function of the indication **(12)**

3- Mention the kinds of blood vessels.



(4) Draw the direction of the friction force in the opposite diagram.

Question (13):

A) what are the defects that results from each of the following?

1- Using of chemical pesticides.

2- Using of chemical fertilizers.

3- Using of industrial wastes.

4- Increasing soil salinity

B) What happens in case of ....?

1- The agricultural soil is polluted with chemical fertilizers.

2- Cultivation of bean plant in salinity soil.

3- Absence of root plants in the soil.

4- Absence of micro organisms from the soil.

5- The human body cannot gets rid of from wastes.

6- The human body keeps urine for a long period of time.

7- Eating foods containing a lot of salts.

8- The two sides of the heart are not separated from each other.

9- Running for 5 minutes with respect to heart beats.

10- Absence of friction between car's tire and the road.

11- Absence of friction between your shoes and the road

12- Increasing the speed of diver in water.

13- Moving cars with high speed on wet road.

14- The cars and airplanes are designed with streamline shapes.

15- No lubrication takes place periodically on the metallic machine parts.

Question (14):

Join from column (A) with the suitable in column (B):

(1)

Column (A)	Column (B)
1- The right atrium.	a- Pumps oxygenated blood to aorta.
2- The right ventricle.	b- Pumps blood out to lungs.
3- The left atrium.	c- Allows blood to flow only from atrium to ventricle.
4- The left ventricle.	d- Carries deoxygenated blood to lungs.
5- Pulmonary vein.	e- Receives deoxygenated blood from venae cavae.
6- Pulmonary artery.	f- Pumps oxygenated blood out to all body parts.
7- Valve.	g- Transfers oxygenated blood from lungs to heart.
	h- Receives oxygenated blood from pulmonary veins.

(2)

Column (A)	Column (B)
1- Red blood cells.	a- It is a watery fluid.
2- White blood cells.	b- Coagulate blood.
3- Blood platelets.	c- Pumps blood out to all body parts.
4- Plasma.	d- Carry oxygen gas from lungs to all the body cells.
	e- Defend the body against microbes.

(3)

Column (A)	Column (B)
1- Chemical fertilizers. 2- Soil salinity. 3- Natural fertilizers. 4- Industrial wastes.	a- Used instead of chemical fertilizers to avoid soil pollution. b- Leads to increasing the soil acidity. c- Increasinng soil salinity in case of overuse. d- Harms the human's and animal's health. e- Increase salts in soil. f- Forming silt soil.

(4)

Column (A)	Column (B)
1- To increase the friction force. 2- Friction force. 3- Grooves on the car's tires... 4- To decrease the friction force.	a- Squeezed out the water under the tires as the friction force doesn't affected. b- Increase the speed of the car. c- Decrease the surface area that exposed to air. d- Opposes the objects movement. e- The speed of car doesn't exceed for a certain limit.

(5)

Column (A)	Column (B)
1- Sit soil. 2- Clay soil. 3- Sand soil.	a- Fast drainage of water. b- Rich with humus. c- Dark color.

Question (15):

Complete the table below:

Points of the comparison	Clay Soil	Silt Soil	Sand Soil
Formation	....	....	....
Color	....	....	....
Size of particles.	....	....	Large
Compactness.	Very compacted	....	....
Drainage of water.	Low	....	....
Fertility.	....	More fertility	....

Model Exam (1) on second term

5^{th} grade

Question (1):

What's meant by each of the folloqing ....?

1- Friction force.

2- Excretory materials.

3- Minor blood circulation.

Question (2):

Put (√) or (x) in front of each of the following, then correct the wrong one:

1- Lubricants and oil are used to decrease the friction force.

2- The heart has two sides.

3- The sandy particles are large and weak compactness.

Question (3):

Complete the following statements:

1- The resistance of water is in a direction .... to direction of object's motion.

2- The presence of .... in car tires reduces the effect of friction force.

3- The deoxygenated blood carries .... gas,while the oxygenated blood carries .... gas.

Question (4):

Prove with a practical experiment ....?

1- Soil drainage of water differs according to their types.

2- The friction force changes by changing the type of the material surface.

Question (5):

What happens when ....?

1- The friction force equals the pushing force.

2- The human kidney can't work properly.

3- The agricultural soil is not fertile.

Model Exam (2) on second term

Question (1):

Write the scientific term for each of the following?

1- Small balls with smooth surfaces are putting between the internal moving parts of machines.

2- Thin loose upper layer which covers the Earth's crust.

3- The decayed remains of living organisms that exists in the soil.

Question (2):

Put (√) or (x) in front of each of the following, then correct the wrong one:

1- As the exposed surface area of the object increases, the resistance of air increases. (   )

2- The consumption of fuel increases as the car's speed increases. (   )

3- Red blood cells defend the body against microbes. (   )

Question (3):

Complete the following statements:

1- .... is the organ responsible for filtering the blood from wastes in the urinary system.

2- .... is the blood vessel that transfers the blood from heart to all body parts.

3- .... soil is composed of clay, silt particles and few amount of sand and humus.

Second Term Test

Question (4):

How can you keep your excretory system healthy?

Question (5):

Compare practically between the three types of soil from the point of view of:

a) The compactness of the soil.

b) The aeration.

c) Absorption of water.

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المواصفات الفنيـة:

مقاس الكتاب:	$\frac{١}{٨}$ (٥٧ × ٨٢) سم
طبع المتن:	٤ لون
طبع الغلاف:	٤ لون
ورق المتن:	٨٠ جم أبيض
ورق الغلاف:	٢٠٠ جم كوشيه
عدد الصفحات بالغلاف:	١٠٤ صفحة

الأشـــراف برنتنج هاوس